Appendix G

CFA Landfill Moisture Monitoring
(October 2000 through September 2001)

G-1. CFA LANDFILL MOISTURE MONITORING (OCTOBER 2000 THROUGH SEPTEMBER 2001)

The overall objective of infiltration monitoring at the Central Facilities Area (CFA) landfills is to document the effectiveness of the landfill covers for minimizing infiltration into the landfill wastes (INEL 1997b). The moisture content of the soil was monitored using time-domain reflectometer and neutron probe instruments. The data from the new deep or vertical time-domain reflectometer systems that were installed in the native soil cover at Landfills II and III to a depth of 2.4 m (8 ft) during August and September 2000 are reported and discussed. Moisture monitoring data from five existing neutron-probe access tubes (NATs) are also reported and discussed.

The terms "infiltration, recharge, and drainage" are used throughout this appendix and are defined in the following sentences. Water that moves into the soil is defined as "infiltration." Water that continues to move downward beyond the evapotranspiration (ET) depth and out of the soil profile is termed "recharge." Infiltration and recharge are represented by an increase in water storage within a system. In addition to recharge, evapotranspiration is a large contributor to decreasing storage in near-surface soils, moving water upward and out of the soil. The term "drainage" refers to water movement out of a unit thickness of soil or a decrease in soil moisture content, but does not indicate the direction of movement.

G-1.1 Neutron-Probe Moisture Monitoring Data

The target for the neutron probe monitoring at the landfills is the volume of water infiltrating past the evapotranspiration or rooting depth. Water that passes through the evapotranspiration depth may pick up contaminants in the landfill waste and carry them to the depth monitored by the NATs. The volumes for infiltration, drainage, and recharge have been calculated for each landfill NAT location from October 2000 through September 2001. The raw data for the five neutron probe monitoring locations are provided in Tables 1 through 5. Calculated infiltration, recharge, and drainage for the five locations are summarized in Table 6.

Neutron probe logs for each NAT show fluctuations through time in the upper 0.9 m (3 ft) that are caused by annual precipitation/snow melt cycles (Figures 1 through 5). The three-dimensional plots show a spike in moisture content in March 2001, but the spike does not penetrate more than 0.9 m (3 ft) except at LF 2-04 located off the landfills. The timing of the moisture increases in the landfill soil indicates that snowmelt is the most significant infiltration event at the landfills. The undulating floor in the three-dimensional charts probably reflects neutron data precision. However, none of the NAT locations showed a ridge of water penetrating the entire soil column as occurred in 1998. The 1998 occurrence was prior to the vegetation becoming established on the landfill covers.

G-1.1.1 Infiltration and Recharge Estimates Using Neutron-Probe Access Tube Data

The calculations of moisture content and volumetric water content are described below. Methods for estimating infiltration and recharge are also described.

The infiltration and recharge for 2001 was estimated by calculating the change in water storage using the following calibration equations:

$MC = 0.000808 \times counts$, for sand and gravel

$MC = 0.00166 \times counts + 4.74$, for clay

where:

MC = moisture content.

The mass water content was converted to a volumetric water content by multiplying the mass water content by the soil bulk density value, determined for samples collected from the boreholes adjacent to the NATs (Edgerton, Germeshausen, and Grier [EG&G] 1988). The equations to calculate volumetric water content (Vol) are:

Vol = MC × 1.98, for sand and gravel

Vol = MC × 1.69, for clay.

The calibration curves were assigned to 0.3-m (1-ft) increments of the NATs based on lithology logs for boreholes drilled next to the tubes located off the landfills (Table 8). For the NATs located on the landfills, 0.3-m (1-ft) increments with count rates less than 5,500 were assigned to the sand and gravel calibration curve, and those with count rates greater than 5,500 were assigned to the clay calibration.

Figures 1 through 5 show that the only measurable infiltration event that penetrates beyond the first foot occurred in the spring of 2001. Consequently, infiltration and recharge were calculated for this spring event and these calculations also reflect recharge for the entire year. Based on the change in storage using the calibration calculations and the assumed evapotranspiration (ET) depth, the estimates of recharge for spring 2001 are less than 0.64 cm (0.25 in.) for all locations except LF 2-04 (Table 9). The recharge at LF 2-04 was calculated to be 0.76 cm (0.30 in.). Infiltration calculations for the five NATs for the spring 2001 ranged from 2.34 to 3.61 cm (0.92 to 1.42 in.). The highest amount of infiltration occurred at LF 2-04, which is located off Landfill II. The infiltration estimates of 2.34 to 3.61 cm (0.92 to 1.42 in.) are consistent with the measured precipitation at the CFA National Oceanic and Atmospheric Administration (NOAA) weather station of 4.6 cm (1.8 in.). The precipitation from November 2000, the time that the surface soil started to freeze, until the spring thaw, approximately March 8, 2001, was 4.6 cm (1.8 in.) (Table 7).

G-1.1.2 Water Storage Analysis for Neutron-Probe Data

Changes in storage refer to changes in soil moisture content over a period that represents a full moisture cycle that is typically a one-year period. Changes in storage at the NAT locations for the period of October 2000 to September 2001 indicate that the entire soil column over the length of the tubes is decreasing in moisture content (Table 6). The change in water storage indicates that moisture contents are decreasing slightly or holding steady within the landfill caps and within the evapotranspiration zones. Location LF 2-07 showed the largest decrease in water storage of 2.54 cm (1.00 in.) over the entire soil column and 2.31 cm (0.91 in.) below the evapotranspiration zone. In contrast, LF 2-03 located near Landfill II showed almost no change in storage over the entire soil column, within the evapotranspiration zone, and below the evapotranspiration zone (Table 6). The other NATs showed slight negative changes in storage over the entire soil column, within the evapotranspiration zone, and below the evapotranspiration zone.

G-1.1.3 Evaluation of Evapotranspiration Depth

The depth to which evapotranspiration is influential depends on the plants and their rooting depths, soil types, and the meteorological conditions that are present. The evapotranspiration depth is assumed to be 0.9 to 1.2 m (3 to 4 ft). For the evapotranspiration depth to be evaluated, enough data are necessary so that yearly variations in moisture content in the upper part of the soil profile can be assessed. The

evapotranspiration depths for the NAT locations are based on the amount of drainage occurring at 0.3-m (1-ft) increments. The drainage from one layer to the next within the evapotranspiration zone should steadily decrease until the zero flux boundary is reached. The depth at which drainage becomes nearly constant is assumed to be the evapotranspiration depth. Plots of drainage for the five NATs are shown on Figure (G-71).

Drainage estimates were made by calculating the change in storage for each 0.3-m (1-ft) layer over the course of one year and then summing the negative changes in storage. The monthly change in storage is calculated for a 1-ft layer and for the soil column as follows:

One-foot layer

$$\Delta Volumetric\ water\ content = (Vol_{march} - Vol_{februaryl}) * 12\ in.$$

Soil Column

$$\Delta Volumetric\ water\ content = \Sigma\ \Delta\ Volumetric\ water\ contents\ for\ each\ one\text{-}foot\ layer.$$

The total drainage varied from 3.16 inches for LF2-03 to 4.32 inches for LF2-07. The drainage below the ET zone varied from 3.45 cm (1.36 in.) for LF3-03 to 7.39 cm (2.91 in.) for LF2-07 (Table 6).

The plots suggest an ET depth of 3 feet for all locations except LF2-04; however, the monitoring period year was significantly below the average winter (November–April) precipitation and yearly precipitation amounts (Table 6).

G-1.2 Time-Domain Reflectometer Data Analysis

Time-domain reflectometer data were collected from two locations at both Landfills II and III, with the volumetric moisture data collected at 15-cm (6-in.) intervals from the surface to a depth of 2.4 m (8 ft) (Figure 6-2 in Section 6). The new time-domain reflectometer systems were installed in August and September 2000. The systems installed were Moisture Point systems from Environmental Sensors, Inc. The Moisture Point system consists of an MP-917, Moisture Point Type-K probes, Campbell Scientific CR10X data logger and COM200 phone modem, solar panel, battery, and probe cables. The MP-917 interrogates the probes and reduces the segment data to a numerical probe data set for export to the CR10X data logger.

Data collection at Landfill III commenced on September 26, 2000. Time-domain reflectometer data collection at Landfill II began on November 9 and December 6, 2000. The data collection at Landfill II started later than that at Landfill III because of communication problems between the two sites. Plots of the time-domain reflectometer data from the beginning of data collection to September 30, 2001, are provided in Figures 7 through 10. The plots show the volumetric moisture content for 15-cm (6-in.) intervals from the surface to a depth of 2.4 m (8 ft). In general, the time-domain reflectometer data showed that the most significant increase in moisture content occurred during the spring 2001 snowmelt event. From September 2000 until February 2001, the time-domain reflectometer probes exhibited wide variations between measurements that reflected data noise rather than changes in moisture content. In February 2001, Environmental Sensors, Inc., loaded a new data reduction algorithm into the MP-917 to reduce data noise, and the MP-917 was insulated to reduce the effects of sub-freezing weather on the electronics.

The monitoring of water movement or absence of infiltration through the soil cover on the landfills is the primary concern of the time-domain reflectometer monitoring at Landfills II and III. The low-

permeability layer of the soil cover is located 15 to 45 cm (6 to 18 in.) below land surface (bls). Moisture contents that increase and decrease within the low-permeability layer indicate the movement of water into and out of this compacted layer. Downward water movement through the low-permeability layer can be determined by examining time-domain reflectometer moisture content data below the low-permeability layer. Increasing moisture contents below the low-permeability layer indicate water moved vertically through the low-permeability layer.

G-1.2.1 Infiltration Calculations Based on Time-Domain Reflectometer Data

In general, the time-domain reflectometer data show an increase in moisture content to depths of less than 0.9 m (3 ft) during the spring snow melt of 2001, which was the most significant infiltration event of the year (Table 10). However, not all increases are due to infiltration. A portion of the rapid "apparent" increase in moisture in March 2001 is attributed to soil thawing. The weather data from October 2000 to April 2001 indicate that the air temperatures were near freezing or colder from November 5, 2000, until approximately March 7, 2001 (Figure 11). Changes in moisture content to depths of 0.6 m (2 ft) would reflect both an adjustment due to soil thawing and an influx of water from snowmelt. When soil water freezes, the dielectric constant of water reduces from approximately 80 to 5. The time-domain reflectometer probes then indicate a false decrease in water content that is consistent with the decrease in the dielectric constant of water when it is frozen. When the soil thaws, the probes reflect the rise in the dielectric constant as ice turns to liquid, and a false increase in water content is detected. Because the spring thaw occurs more suddenly than soil freezing in the fall, the spring shift is more pronounced on the moisture content curves. The apparent decrease in soil moisture for the surface to 0.6-m (2-ft) deep time-domain reflectometer probes probably reflects soil moisture freezing (Figures 7 through 10).

Infiltration and drainage calculations for the spring snow melt of 2001 indicate that the time-domain reflectometer results are greater than the measured precipitation at the CFA NOAA weather station. The calculated infiltration for the three functioning time-domain reflectometer locations ranges from 5.41 to 9.80 cm (2.12 to 3.86 in.) (Table 11). However, the measured precipitation at the CFA NOAA weather station is only 4.6 cm (1.8 in.). Similarly, drainage or losses in storage for the three time-domain reflectometer arrays ranges from 5.72 to 9.75 cm (2.25 to 3.84 in.) of water. An explanation for the discrepancy between the measured precipitation at the CFA NOAA weather station and infiltration could be ponding of water or snowdrifts above the time-domain reflectometer locations. However, neither ponding nor snowdrifts were observed at the locations during snowmelt. The high time-domain reflectometer readings could be related to probe calibration or to physical nonconformities in the subsurface, such as water filling void pockets beside the probe.

In contrast to the spring snowmelt event, several precipitation events in 2000 and 2001 appeared to affect only the 0- to 15-cm (0- to 6-in.) depth interval. In 2000, two precipitation events in the form of rain occurred on October 10 and 11 (1.20 cm [0.48 in.]) and October 29 and 30 (1.19 cm [0.47 in.]). These precipitation events are strongly reflected at the 15-cm (6-in.) depth, but there appears to be little response below this depth, with the calculated amount of infiltration into the 0- to 15-cm (0- to 6-in.) depth being similar to the amount of precipitation (Figures 7 through 10). Additionally, two smaller precipitation events occurred in April 2001 after the snowmelt. These precipitation events show up as small spikes in the 0- to 15-cm (0- to 6-in.) and 15- to 30-cm (6- to 12-in.) intervals for all four time-domain reflectometer locations (Figures 7 through 10). A precipitation event of 1.19 cm (0.47 in.) in September 2001 appears as a small spike in only the 0- to 15-cm (0- to 6-in.) interval at all four time-domain reflectometer locations, with the calculated amount of infiltration less than half the precipitation.

G-1.2.2 Water Storage Analyses for the Time-Domain Reflectometer Locations

Infiltration, drainage, and evapotranspiration affect the amount of water in storage in the soil profile. Water storage analysis in this section reflects the change in moisture content over a period of approximately one year (October 2000 through September 2001). This one-year period is used to evaluate the net impacts of infiltration, drainage, and evapotranspiration on the soil profile (i.e., gaining or losing moisture). The change in storage is represented by the following equation:

$$\Delta S = I - D - ET$$

where:

ΔS = change in storage

I = infiltration

D = drainage out of a system

ET = evapotranspiration.

The infiltration, drainage, and evapotranspiration out of soil are nearly impossible to measure directly. However, the time-domain reflectometer probes do measure moisture content from which change in storage (ΔS) can be inferred. If the change in storage is positive over time, there is a net gain of water in the soil profile. Conversely, if the change is negative, there is a net water loss from the soil profile.

Changes in storage were estimated for the entire 2.4-m (8-ft) depth of each time-domain reflectometer below land surface (Table 6). The change in storage (ΔS) was calculated for each interval by multiplying the change in moisture content, ΔMC, by the thickness of the soil unit (L) or 15 cm (6 in.) for each segment, mathematically expressed as follows:

$$\Delta S = \Delta MC \times L$$

where:

ΔS = change in storage

ΔMC = moisture content

L = soil unit thickness.

The change in storage for the 2.4-m (8-ft) profile was calculated for September 26, 2000, through September 30, 2001, for the time-domain reflectometers at Landfill III and November 9, 2000, through September 30, 2001, for those at Landfill II. This encompasses spring infiltration as well as the summer evapotranspiration.

There was little change in storage over the monitoring period for the 0- to 0.6-m (0- to 2-ft) depth intervals for the landfill caps at the four time-domain reflectometer locations (Table 12). Changes in storage at Landfill II were 0.08 and -1.04 cm (0.03 and -0.41 in.). At Landfill III, changes in storage were 0.28 and -0.48 cm (0.11 and -0.19 in.) Three of the four locations showed a gain in storage for the 0- to 2.4-m (0- to 8-ft) depth interval over the monitoring period (Table 12). Changes in storage ranged from 2.21 cm (0.87 in.) for Landfill II (north) to -0.48 cm (-0.19 in.) for Landfill III (west).

At Landfill III, from depths of 1.2 to 2.4 m (4 to 8 ft) or below the estimated evapotranspiration depth of 0.9 to 1.2 m (3 to 4 ft), there was essentially no change in storage. However, at Landfill II, both probe locations showed an approximate 1.3-cm (0.5-in.) increase in soil moisture storage. Only one 15-cm (6-in.) interval at each probe location showed a significant increase in moisture content (an increase greater than 2.5% moisture content) below 1.2 m (4 ft). The gains in water storage at the Landfill II probe locations for 2001 suggest that water moved through the low-permeability layer and into the soil below. However, most of the increase below the ET depth (1.2 m or 4 ft) is from segments that do not show a significant increase in moisture content. The changes in moisture content for the other 15-cm (6-in.) intervals could reflect measurement uncertainty or probe measurement error, but summing these changes added up to nearly 1.3 cm (0.5 in.). Because only one interval showed a significant increase in moisture content, this suggests that any recharge was slight, less than 0.64 cm (0.25 in.), and that evapotranspiration consumed most to all of the infiltrated water for the spring 2001 snowmelt.

G-1.3 Comparison of Time-Domain Reflectometer and Neutron-Probe Data

The neutron-probe data for LF 3-05 and LF 2-07 and the time-domain reflectometer data from Landfills II and III were compared, because the NAT locations and time-domain reflectometers are in the same proximity (refer to Figure 6-2 in Section 6). The neutron probe and time-domain reflectometer data were compared with regard to recharge estimates, depth of wetting front penetration, and infiltration estimates.

The time-domain reflectometer and the neutron probe monitoring on the landfills both indicate that recharge was less than 0.64 cm (0.25 in.) on the landfills, and that the wetting front in the spring of 2001 penetrated only about 0.9 m (3 ft). Off Landfill II, NAT LF 2-04 showed a wetting front penetration to at least 1.8 m (6 ft), but no time-domain reflectometers were located off the landfills for comparison.

The primary difference between the time-domain reflectometer and neutron probe measurements was that the calculated amount of infiltration using the time-domain reflectometers was considerably higher than determined from the neutron probe measurements and also much greater than the measured precipitation at the CFA NOAA weather station. Part of the overestimation by the time-domain reflectometers could be that the rapid increase in water content in mid-March 2001 is due to both the soil thaw and infiltration. The calibration of the time-domain reflectometers needs to be evaluated.

Table G-1. Neutron-probe measurements and change in moisture content for LF 2-03 from 10/26/00 to 9/17/01.

Depth	10/26/2000[a]	11/29/2000		12/21/2000		2/15/2001		2/28/2001		3/15/2001		3/28/2001		4/18/2001		5/17/2001		6/12/2001		7/19/2001		8/21/2001		9/17/2001		Change in Storage 10/00–9/01	Sum of Drainage (-) 10/00–9/01
0	1,818	2,745	0.09	3,082	0.03	3,882	0.08	4,502	0.06	3,721	-0.07	3,003	-0.07	2,789	-0.02	2,094	-0.07	1,674	-0.04	1,367	-0.03	1,220	-0.01	1,725	0.05	-0.01	-0.32
0.92	3,279	3,362	0.02	3,314	-0.01	3,273	-0.01	3,448	0.03	6,526	0.59	6,221	-0.06	5,913	-0.06	4,968	-0.18	3,941	-0.20	3,446	-0.10	3,307	-0.03	3,324	0.00	0.01	-0.63
1.92	2,974	3,055	0.02	2,956	-0.02	3,085	0.02	3,098	0.00	3,722	0.12	4,500	0.15	4,504	0.00	4,213	-0.06	3,727	-0.09	3,271	-0.09	3,082	-0.04	3,119	0.01	0.03	-0.29
2.92	3,265	3,228	-0.01	3,159	-0.01	3,317	0.03	3,233	-0.02	3,182	-0.01	3,250	0.01	3,339	0.02	3,316	0.00	3,384	0.01	3,083	-0.06	3,102	0.00	2,975	-0.02	-0.06	-0.12
3.92	3,214	3,150	-0.01	3,178	0.01	3,204	0.00	3,239	0.01	3,198	-0.01	3,223	0.00	3,211	0.00	3,196	0.00	3,294	0.02	3,244	-0.01	3,124	-0.02	3,216	0.02	0.00	-0.05
4.92	3,389	3,377	0.00	3,176	-0.04	3,355	0.03	3,266	-0.02	3,343	0.01	3,320	0.00	3,308	0.00	3,376	0.01	3,232	-0.03	3,168	-0.01	3,378	0.04	3,207	-0.03	-0.03	-0.12
5.92	3,515	3,587	0.01	3,601	0.00	3,421	-0.03	3,570	0.03	3,585	0.00	3,466	-0.02	3,456	0.00	3,581	0.02	3,411	-0.03	3,389	0.00	3,476	0.02	3,473	0.00	-0.01	-0.09
6.92	4,101	4,165	0.02	4,231	0.02	4,111	-0.03	4,031	-0.02	4,069	0.01	3,919	-0.04	4,004	0.02	4,116	0.03	4,178	0.02	3,941	-0.06	3,934	0.00	4,069	0.04	-0.01	-0.16
7.92	3,614	3,838	0.04	3,656	-0.03	3,807	0.03	3,748	-0.01	3,761	0.00	3,767	0.00	3,708	-0.01	3,779	0.01	3,726	-0.01	3,702	0.00	3,585	-0.02	3,588	0.00	0.00	-0.09
8.92	3,588	3,636	0.01	3,537	-0.02	3,498	-0.01	3,418	-0.02	3,400	0.00	3,461	0.01	3,540	0.02	3,550	0.00	3,592	0.01	3,555	-0.01	3,524	-0.01	3,602	0.01	0.00	-0.06
9.92	4,513	4,408	-0.02	4,362	-0.01	4,366	0.00	4,324	-0.01	4,216	-0.02	4,488	0.05	4,264	-0.04	4,327	0.01	4,376	0.01	4,408	0.01	4,389	0.00	4,463	0.01	-0.01	-0.10
10.92	4,228	4,180	-0.01	4,233	0.01	4,269	0.01	4,178	-0.02	4,270	0.02	4,181	-0.02	4,089	-0.02	4,287	0.04	4,233	-0.01	4,189	-0.01	4,018	-0.03	4,178	0.03	-0.01	-0.11
11.92	3,584	3,682	0.02	3,641	-0.01	3,697	0.01	3,610	-0.02	3,602	0.00	3,653	0.01	3,631	0.00	3,751	0.02	3,740	0.00	3,642	-0.02	3,687	0.01	3,697	0.00	0.02	-0.05
12.92	3,860	3,989	0.02	3,775	-0.04	3,842	0.01	3,855	0.00	3,801	-0.01	3,917	0.02	3,823	-0.02	4,003	0.03	3,777	-0.04	3,899	0.02	3,921	0.00	3,862	-0.01	0.00	-0.08
13.92	4,077	4,138	0.01	4,178	0.01	4,002	-0.03	4,164	0.03	4,272	0.02	4,201	-0.01	4,081	-0.02	4,105	0.00	4,081	0.00	3,980	-0.02	4,142	0.03	4,079	-0.01	0.00	-0.10
14.92	4,131	4,135	0.00	4,116	0.00	4,133	0.00	4,092	-0.01	4,026	-0.01	4,070	0.01	4,077	0.00	4,192	0.02	4,089	-0.02	4,094	0.00	4,140	0.01	4,151	0.00	0.00	-0.04
15.92	3,696	3,703	0.00	3,670	-0.01	3,608	-0.01	3,751	0.03	3,765	0.00	3,708	-0.01	3,674	-0.01	3,717	0.01	3,803	0.02	3,637	-0.03	3,766	0.02	3,730	-0.01	0.01	-0.07
16.92	4,485	4,774	0.06	4,733	-0.01	4,509	-0.04	4,714	0.04	4,549	-0.03	4,535	0.00	4,611	0.01	4,645	0.01	4,487	-0.03	4,590	0.02	4,634	0.01	4,753	0.02	0.05	-0.04
17.92	5,879	5,752	-0.02	5,652	-0.02	5,674	0.00	5,823	0.03	5,798	0.00	5,878	0.02	5,743	-0.03	5,843	0.02	5,762	-0.02	5,802	0.01	5,642	-0.03	5,911	0.05	0.01	-0.12
18.92	4,245	4,310	0.01	4,220	-0.02	4,188	-0.01	4,264	0.01	4,320	0.01	4,308	0.00	4,377	0.01	4,274	-0.02	4,229	-0.01	4,205	0.00	4,435	0.04	4,409	0.00	0.03	-0.06
19.92	7,547	7,432	-0.04	7,588	0.05	7,651	0.02	7,674	0.01	7,623	-0.02	7,575	-0.02	7,516	-0.02	7,636	0.04	7,697	0.02	7,616	-0.03	7,585	-0.01	7,400	-0.06	-0.05	-0.19
20.92	9,075	8,972	-0.03	8,953	-0.01	8,820	-0.04	8,996	0.06	9,018	0.01	8,957	-0.02	8,920	-0.01	8,987	0.02	9,016	0.01	9,045	0.01	8,908	-0.05	9,099	0.06	0.01	-0.16
21.92						9,724		9,914	0.06	9,788	-0.04	9,785	0.00	9,739	-0.02	9,815	0.03	9,865	0.02	9,945	0.03	9,751	-0.07			0.01	-0.12

Total change in storage:	-0.01
Total change in storage below ET depth:	0.02
Total drainage:	-3.16
Total drainage below ET depth:	-1.76

Note: ET depth was set at 3.92 feet to be consistent with previous data analysis. The ET depth will be evaluated after four years of data are available.

a. Under the date, there are two columns. The first column is the neutron probe counts. The second column shows the change in moisture content from the previous month.

Table G-2. Neutron-probe measurements and change in moisture content for LF 2-04 from 10/26/01 to 9/17/01.

Depth	10/26/2000[a]	11/29/2000		12/21/2000		2/15/2001		2/28/2001		3/15/2001		3/28/2001		4/18/2001		5/17/2001		6/12/2001		7/19/2001		8/21/2001		9/17/2001		Change in Storage 10/00–9/01	Sum of Drainage (-) 10/00–9/01
0.14	2,997	4,058	0.10	4,297	0.02	4,575	0.03	5,254	0.07	5,587	0.03	4,980	-0.06	4,763	-0.02	2,829	-0.19	2,520	-0.03	2,380	-0.01	2,180	-0.02	2,799	0.06	-0.02	-0.33
1.14	2,974	2,803	-0.03	2,838	0.01	2,905	0.01	2,863	-0.01	4,785	0.37	4,328	-0.09	4,253	-0.01	3,534	-0.14	3,174	-0.07	2,957	-0.04	2,482	-0.09	2,804	0.06	-0.03	-0.48
2.14	3,079	3,041	-0.01	3,019	0.00	3,112	0.02	3,060	-0.01	4,650	0.31	4,238	-0.08	4,090	-0.03	3,849	-0.05	3,690	-0.03	3,342	-0.07	3,150	-0.04	2,933	-0.04	-0.03	-0.35
3.14	3,312	3,277	-0.01	3,229	-0.01	3,280	0.01	3,231	-0.01	4,503	0.24	4,281	-0.04	4,085	-0.04	3,910	-0.03	3,796	-0.02	3,425	-0.07	3,064	-0.07	3,091	0.01	-0.04	-0.30
4.14	3,597	3,451	-0.03	3,347	-0.02	3,388	0.01	3,419	0.01	4,803	0.27	4,285	-0.10	3,966	-0.06	3,916	-0.01	3,724	-0.04	3,597	-0.02	3,466	-0.03	3,361	-0.02	-0.05	-0.32
5.14	4,066	3,858	-0.04	4,014	0.03	3,854	-0.03	3,798	-0.01	4,780	0.19	4,591	-0.04	4,428	-0.03	4,392	-0.01	4,397	0.00	4,098	-0.06	4,125	0.01	3,892	-0.04	-0.03	-0.26
6.14	3,622	3,661	0.01	3,485	-0.03	3,525	0.01	3,494	-0.01	3,578	0.02	4,313	0.14	4,163	-0.03	4,147	0.00	3,975	-0.03	3,744	-0.04	3,723	0.00	3,460	-0.05	-0.03	-0.20
7.14	3,784	3,697	-0.02	3,739	0.01	3,742	0.00	3,667	-0.01	3,699	0.01	3,817	0.02	3,906	0.02	4,007	0.02	3,991	0.00	3,943	-0.01	3,830	-0.02	3,714	-0.02	-0.01	-0.09
8.14	3,850	3,850	0.00	4,017	0.03	3,943	-0.01	3,918	0.00	3,967	0.01	3,902	-0.01	3,801	-0.02	4,001	0.04	3,952	-0.01	3,915	-0.01	3,960	0.01	3,961	0.00	0.02	-0.07
9.14	4,459	4,524	0.01	4,427	-0.02	4,318	-0.02	4,371	0.01	4,349	0.00	4,383	0.01	4,476	0.02	4,349	-0.02	4,453	0.02	4,531	0.01	4,529	0.00	4,446	-0.02	0.00	-0.07
10.14	4,624	4,531	-0.02	4,414	-0.02	4,481	0.01	4,402	-0.02	4,552	0.03	4,553	0.00	4,556	0.00	4,621	0.01	4,542	-0.02	4,508	-0.01	4,762	0.05	4,649	-0.02	0.00	-0.10
11.14	3,737	3,699	-0.01	3,863	0.03	3,788	-0.01	3,958	0.03	3,783	-0.03	3,787	0.00	3,736	-0.01	3,769	0.01	3,792	0.00	3,826	0.01	3,837	0.00	3,807	-0.01	0.01	-0.06
12.14	4,160	4,168	0.00	4,085	-0.02	4,106	0.00	4,128	0.00	4,068	-0.01	3,977	-0.02	4,133	0.03	4,021	-0.02	4,079	0.01	4,009	-0.01	4,154	0.03	4,068	-0.02	-0.02	-0.09
13.14	3,944	3,985	0.01	3,889	-0.02	3,962	0.01	3,853	-0.02	3,970	0.02	3,862	-0.02	3,958	0.02	3,936	0.00	3,808	-0.02	3,926	0.02	3,940	0.00	3,947	0.00	0.00	-0.08
14.14	4,122	4,114	0.00	4,167	0.01	4,233	0.01	4,125	-0.02	4,171	0.01	4,055	-0.02	4,060	0.00	4,142	0.02	4,153	0.00	4,170	0.00	4,156	0.00	4,153	0.00	0.01	-0.03
15.14	3,700	3,820	0.02	3,831	0.00	3,715	-0.02	3,865	0.03	3,679	-0.04	3,718	0.01	3,791	0.01	3,645	-0.03	3,756	0.02	3,825	0.01	3,766	-0.01	3,794	0.01	0.02	-0.10
16.14	4,106	4,137	0.01	4,078	-0.01	4,070	0.00	4,197	0.02	4,041	-0.03	3,915	-0.02	4,197	0.05	4,116	-0.02	4,113	0.00	4,053	-0.01	4,133	0.02	4,165	0.01	0.01	-0.09
17.14	3,474	3,512	0.01	3,465	-0.01	3,386	-0.02	3,439	0.01	3,436	0.00	3,376	-0.01	3,445	0.01	3,503	0.01	3,418	-0.02	3,392	0.00	3,505	0.02	3,476	-0.01	0.00	-0.06
18.14	3,524	3,590	0.01	3,568	0.00	3,480	-0.02	3,551	0.01	3,622	0.01	3,538	-0.02	3,530	0.00	3,536	0.00	3,491	-0.01	3,603	0.02	3,768	0.03	3,660	-0.02	0.03	-0.07
19.14	4,164	4,096	-0.01	4,155	0.01	4,188	0.01	4,280	0.02	4,033	-0.05	4,144	0.02	4,113	-0.01	4,280	0.03	4,195	-0.02	4,217	0.00	4,121	-0.02	4,148	0.01	0.00	-0.09
20.14	6,188	6,144	-0.01	6,156	0.00	5,932	-0.08	6,076	0.05	6,119	0.01	5,981	-0.05	6,119	0.05	5,987	-0.04	5,971	-0.01	6,093	0.04	6,007	-0.03	5,852	-0.05	-0.11	-0.22
21.14	8,819	8,758	-0.02	8,675	-0.03	8,726	0.02	8,664	-0.02	8,697	0.01	8,580	-0.04	8,832	0.08	8,837	0.00	8,735	-0.03	8,755	0.01	8,731	-0.01	8,777	0.02	-0.01	-0.15

Total change in storage:	-0.29
Total change in storage below ET depth:	-0.13
Total drainage:	-3.62
Total drainage below ET depth:	-1.83

Note: ET depth was set at 4.14 feet to be consistent with previous data analysis. The ET depth will be evaluated after four years of data are available.

a. Under the date, there are two columns. The first column is the neutron probe counts. The second column shows the change in moisture content from the previous month.

Table G-3. Neutron-probe measurements and change in moisture content for LF 2-07 from 10/26/01 to 9/17/01.

Depth	10/26/2000[a]	11/29/2000		12/21/2000		2/15/2001		2/28/2001		3/15/2001		3/28/2001		4/18/2001		5/17/2001		6/12/2001		7/19/2001		8/21/2001		9/17/2001		Change in Storage 10/00–9/01	Sum of Drainage (-) 10/00–9/01
	87	86		91		190		903		89		96		91		79		63		79		89		79			
0	1497	2,425		2,832		3,767		4,526		5,151		3,465		3,237		2,257		1,666		1,327		914		1,407			
0.84	4476	4,489	0.00	4,459	-0.01	4,469	0.00	4,390	-0.03	7,056	0.90	7,801	0.25	7,423	-0.13	6,806	-0.21	6,128	-0.23	4,901	-0.41	4,466	-0.15	4,483	0.01	0.00	-1.15
1.84	3601	3,954	0.07	3,915	-0.01	3,999	0.02	3,851	-0.03	3,825	0.00	3,944	0.02	4,157	0.04	4,136	0.00	4,012	-0.02	3,774	-0.05	3,698	-0.01	3,637	-0.01	0.01	-0.14
2.84	4641	4,657	0.00	4,590	-0.01	4,831	0.05	4,689	-0.03	4,688	0.00	4,829	0.03	4,720	-0.02	4,795	0.01	4,744	-0.01	4,859	0.02	4,719	-0.03	4,613	-0.02	-0.01	-0.12
3.84	6085	6,017	-0.02	5,975	-0.01	5,929	-0.02	5,800	-0.04	5,869	0.02	5,831	-0.01	5,875	0.01	5,861	0.00	5,833	-0.01	5,913	0.03	5,964	0.02	5,822	-0.05	-0.09	-0.17
4.84	5456	5,360	-0.03	5,244	-0.04	5,014	-0.08	5,114	0.03	5,100	0.00	5,094	0.00	5,064	-0.01	5,310	0.08	5,025	-0.10	5,131	0.04	5,137	0.00	5,214	0.03	-0.08	-0.26
5.84	5011	4,997	0.00	4,975	-0.01	4,916	-0.02	4,945	0.01	5,083	0.05	5,038	-0.02	4,810	-0.08	4,911	0.03	4,799	-0.04	4,985	0.06	4,891	-0.03	4,934	0.01	-0.03	-0.18
6.84	6277	6,286	0.00	6,251	-0.01	6,170	-0.03	6,094	-0.03	6,105	0.00	6,134	0.01	6,246	0.04	6,206	-0.01	6,266	0.02	6,127	-0.05	6,181	0.02	6,106	-0.03	-0.06	-0.14
7.84	6860	6,932	0.02	6,786	-0.05	6,764	-0.01	6,666	-0.03	6,532	-0.05	6,486	-0.02	6,676	0.06	6,684	0.00	6,846	0.05	6,613	-0.08	6,728	0.04	6,857	0.04	0.00	-0.23
8.84	6704	6,802	0.02	6,630	-0.03	6,871	0.05	6,567	-0.06	6,641	0.01	6,576	-0.01	6,658	0.02	6,682	0.00	6,699	0.00	6,681	0.00	6,657	0.00	6,690	0.01	0.00	-0.10
9.84	5489	5,532	0.01	5,438	-0.03	5,588	0.05	5,442	-0.05	5,541	0.03	5,506	-0.01	5,431	-0.03	5,416	-0.01	5,378	-0.01	5,436	0.02	5,421	-0.01	5,358	-0.02	-0.04	-0.16
10.84	7534	7,301	-0.08	7,329	0.01	7,366	0.01	7,496	0.04	7,276	-0.07	7,356	0.03	7,348	0.00	7,370	0.01	7,352	-0.01	7,264	-0.03	7,161	-0.03	7,167	0.00	-0.12	-0.22
11.84	5358	5,210	-0.03	5,188	0.00	5,058	-0.02	5,221	0.03	5,310	0.02	5,287	0.00	5,208	-0.02	5,199	0.00	5,175	0.00	5,339	0.03	5,213	-0.02	5,198	0.00	-0.03	-0.11
12.84	5543	5,521	0.00	5,551	0.01	5,581	0.01	5,508	-0.01	5,504	0.00	5,615	0.02	5,542	-0.01	5,479	-0.01	5,556	0.01	5,508	-0.01	5,521	0.00	5,572	0.01	0.01	-0.05
13.84	6325	6,320	0.00	6,200	-0.04	6,057	-0.05	6,203	0.05	6,252	0.02	6,147	-0.04	6,130	-0.01	6,159	0.01	6,171	0.00	6,053	-0.04	6,035	-0.01	6,081	0.02	-0.08	-0.17
14.84	7706	7,608	-0.03	7,450	-0.05	7,510	0.02	7,578	0.02	7,593	0.01	7,505	-0.03	7,454	-0.02	7,592	0.05	7,298	-0.10	7,519	0.07	7,485	-0.01	7,358	-0.04	-0.12	-0.29
15.84	8760	8,714	-0.02	8,490	-0.08	8,448	-0.01	8,560	0.04	8,498	-0.02	8,605	0.04	8,509	-0.03	8,413	-0.03	8,436	0.01	8,438	0.00	8,340	-0.03	11,519		-0.14	-0.22
16.84	14741	14,951	0.07	14,692	-0.09	14,824	0.04	14,822	0.00	14,751	-0.02	14,556	-0.07	14,560	0.00	14,638	0.03	14,535	-0.03	14,605	0.02	14,858	0.09	8,504		0.04	-0.21
17.84	7539	7,614	0.03	7,506	-0.04	7,445	-0.02	7,460	0.01	7,470	0.00	7,466	0.00	7,548	0.03	7,414	-0.05	7,460	0.02	7,417	-0.01	7,399	-0.01	7,941		-0.05	-0.12
18.84		8,109		8,168	0.02			7,996	-0.06	7,443	-0.19	7,311	-0.04	7,571	0.09	7,484	-0.03	7,389	-0.03	7,470	0.03	7,509	0.01			-0.20	-0.26

Total change in storage:	-1.00
Total change in storage below ET depth:	-0.91
Total drainage:	-4.32
Total drainage below ET depth:	-2.91
Change in storage within the cap (2 feet)	0.01

Note: ET depth was set at 3.84 feet to be consistent with previous data analysis. The ET depth will be evaluated after four years of data are available.

a. Under the date, there are two columns. The first column is the neutron probe counts. The second column shows the change in moisture content from the previous month.

Table G-4. Neutron-probe measurements and change in moisture content for LF 3-03 from 10/26/00 to 9/17/01.

Depth	10/26/2000[a]	11/29/2000		12/21/2000		2/15/2001		2/28/2001		3/15/2001		3/28/2001		4/18/2001		5/17/2001		6/12/2001		7/19/2001		8/21/2001		9/18/2001		Change in Storage 10/00–9/01	Sum of Drainage (-) 10/00–9/01
	68	66		62		108		360		75		64		58		52		53		55		50		74			
-0.3	479	954		2,021		2,771		3,791		1,965		1,420		1,182		678		449		340		320		454			
0.7	3,588	3,790	0.07	3,689	-0.03	3,813	0.04	3,848	0.01	7,638	1.28	7,136	-0.17	6,860	-0.09	5,394	-0.49	4,240	-0.39	3,883	-0.12	3,718	-0.06	3,616	-0.03	0.01	-1.39
1.7	4,698	4,636	-0.01	4,752	0.02	4,545	-0.04	4,719	0.03	4,681	-0.01	5,672	0.19	5,745	0.01	5,523	-0.04	5,320	-0.04	4,929	-0.08	4,844	-0.02	4,655	-0.04	-0.01	-0.27
2.7	4,227	4,181	-0.02	4,067	-0.04	4,079	0.00	4,092	0.00	4,278	0.06	4,159	-0.04	4,235	0.03	4,328	0.03	4,362	0.01	4,359	0.00	4,251	-0.04	4,092	-0.05	-0.05	-0.18
3.7	3,000	2,891	-0.02	3,013	0.02	3,085	0.01	3,020	-0.01	3,023	0.00	3,038	0.00	3,083	0.01	3,085	0.00	3,035	-0.01	3,078	0.01	3,090	0.00	2,965	-0.02	-0.01	-0.06
4.7	2,913	2,837	-0.01	2,842	0.00	2,879	0.01	2,942	0.01	2,922	0.00	2,872	-0.01	2,952	0.02	2,973	0.00	2,910	-0.01	2,903	0.00	2,832	-0.01	2,897	0.01	0.00	-0.05
5.7	2,972	2,882	-0.02	3,003	0.02	2,922	0.02	2,932	0.00	2,837	-0.02	3,050	0.04	2,939	-0.02	2,992	0.01	2,889	-0.02	2,864	0.00	2,844	0.00	2,921	0.01	-0.01	-0.10
6.7	2,940	3,030	0.02	3,046	0.00	3,083	0.01	3,089	0.00	2,996	-0.02	3,007	0.00	3,123	0.02	3,013	-0.02	2,835	-0.03	2,928	0.02	2,910	0.00	2,990	0.02	0.01	-0.07
7.7	3,533	3,702	0.03	3,628	-0.01	3,614	0.00	3,564	-0.01	3,631	0.01	3,623	0.00	3,679	0.01	3,614	-0.01	3,395	-0.04	3,317	-0.01	3,386	0.01	3,345	-0.01	-0.04	-0.11
8.7	4,067	4,050	0.00	3,942	-0.02	3,940	0.00	3,859	-0.02	3,989	0.02	3,861	-0.02	3,915	0.01	3,919	0.00	3,788	-0.03	3,732	-0.01	3,783	0.01	3,789	0.00	-0.05	-0.10
9.7	3,915	3,943	0.01	3,843	-0.02	3,800	0.01	3,898	0.02	3,874	0.00	3,854	0.00	3,889	0.01	3,812	-0.01	3,860	0.01	3,802	-0.01	3,751	-0.01	3,775	0.00	-0.03	-0.07
10.7	3,532	3,434	-0.02	3,353	-0.02	3,528	0.03	3,560	0.01	3,539	0.00	3,447	-0.02	3,491	0.01	3,507	0.00	3,481	0.00	3,484	0.00	3,448	-0.01	3,572	0.02	0.01	-0.06
11.7	4,059	4,194	0.03	4,046	-0.03	4,069	0.00	4,118	0.01	3,941	-0.03	4,045	0.02	4,015	-0.01	4,071	0.01	3,985	-0.02	4,021	0.01	3,975	-0.01	3,973	0.00	-0.02	-0.07
12.7	3,977	3,976	0.00	3,948	-0.01	4,007	0.01	4,115	0.02	3,974	-0.03	3,909	-0.01	3,986	0.01	4,010	0.00	4,022	0.00	3,937	-0.02	4,008	0.01	4,072	0.01	0.02	-0.05
13.7	4,211	4,297	0.02	4,189	-0.02	4,104	0.02	4,217	0.02	4,138	-0.02	4,140	0.00	4,252	0.02	4,149	-0.02	4,236	0.02	4,132	-0.02	4,287	0.03	4,119	-0.03	-0.02	-0.12
14.7	3,697	3,651	-0.01	3,698	0.01	3,675	0.00	3,715	0.01	3,638	-0.01	3,782	0.03	3,689	-0.02	3,811	0.02	3,619	-0.04	3,644	0.00	3,700	0.01	3,730	0.01	0.01	-0.08
15.7	3,885	3,957	0.01	4,013	0.01	4,105	0.02	4,018	-0.02	4,076	0.01	4,032	-0.01	3,904	-0.02	3,985	0.02	4,093	0.02	4,048	-0.01	3,944	-0.02	3,838	-0.02	-0.01	-0.10
16.7	3,911	3,692	-0.04	3,802	0.02	3,836	0.01	3,764	-0.01	3,833	0.01	3,800	-0.01	3,822	0.00	3,774	-0.01	3,882	0.02	3,770	-0.02	3,772	0.00	3,702	-0.01	-0.04	-0.10
17.7	3,714	3,810	0.02	3,696	-0.02	3,788	0.02	3,692	-0.02	3,726	0.01	3,672	-0.01	3,894	0.04	3,776	-0.02	3,804	0.01	3,738	-0.01	3,608	-0.02	3,841	0.04	0.02	-0.11
18.7	4,053	4,049	0.00	3,900	-0.03	3,972	0.01	4,001	0.01	3,986	0.00	4,001	0.00	4,035	0.01	4,061	0.00	3,946	-0.02	4,044	0.02	3,833	-0.04	3,964	0.03	-0.02	-0.09
19.7	4,244	4,234	0.00	4,317	0.02	4,228	0.02	4,195	-0.01	4,249	0.01	4,175	-0.01	4,252	0.01	4,157	-0.02	4,195	0.01	4,202	0.00	4,146	-0.01	4,089	-0.01	-0.03	-0.08

Total change in storage:	-0.24
Total change in storage below ET depth:	-0.19
Total drainage:	-3.25
Total drainage below ET depth:	-1.36
Change in storage within the cap (2 feet)	0.00

Note: ET depth was set at 3.84 feet to be consistent with previous data analysis. The ET depth will be evaluated after four years of data are available.

a. Under the date, there are two columns. The first column is the neutron probe counts. The second column shows the change in moisture content from the previous month.

Table G-5. Neutron-probe measurements and change in moisture content for LF 3-05 from 10/26/00 to 9/17/01.

Depth	10/26/2000[a]	11/29/2000		12/21/2000		2/15/2001		2/28/2001		3/15/2001		3/28/2001		4/18/2001		5/17/2001		6/12/2001		7/19/2001		8/21/2001		9/17/2001		Change in Storage 10/00–9/01	Sum of Drainage (-) 10/00–9/01
	111	130		127		435		1,379		142		132		110		91		85		79		113		94			
0.1	3,165	3,803	0.07	3,845	0.00	4,298	0.05	4,623	0.03	7,790	0.38	6,734	-0.14	6,443	-0.04	4,631	-0.23	3,864	-0.10	3,026	-0.11	2,694	-0.05	3,021	0.03	-0.09	-0.67
1.1	3,855	3,918	0.02	3,843	-0.03	3,703	-0.05	3,728	0.01	5,765	0.69	6,175	0.14	6,032	-0.05	5,554	-0.16	4,709	-0.28	4,140	-0.19	3,962	-0.06	3,945	-0.01	0.03	-0.82
2.1	3,572	3,631	0.01	3,703	0.01	3,661	-0.01	3,781	0.02	3,716	-0.01	3,723	0.00	3,732	0.00	3,704	-0.01	3,630	-0.01	3,614	0.00	3,573	-0.01	3,539	-0.01	-0.01	-0.05
3.1	3,910	4,076	0.03	3,999	-0.01	4,083	0.02	4,159	0.01	4,165	0.00	4,179	0.00	4,232	0.01	4,201	-0.01	4,068	-0.03	3,972	-0.02	3,791	-0.03	3,994	0.04	0.02	-0.10
4.1	5,922	5,875	-0.02	5,810	-0.02	5,767	-0.01	5,811	0.01	5,806	0.00	5,919	0.04	5,812	-0.04	5,847	0.01	5,823	-0.01	5,810	0.00	5,663	-0.05	5,567	-0.03	-0.12	-0.18
5.1	3,934	4,123	0.04	3,955	-0.03	4,027	0.01	3,970	-0.01	3,965	0.00	4,028	0.01	3,995	-0.01	4,002	0.00	3,883	-0.02	3,920	0.01	4,025	0.02	3,844	-0.03	-0.02	-0.11
6.1	2,767	2,736	-0.01	2,715	0.00	2,687	-0.01	2,686	0.00	2,797	0.02	2,732	-0.01	2,738	0.00	2,802	0.01	2,694	-0.02	2,617	-0.01	2,732	0.02	2,756	0.00	0.00	-0.06
7.1	2,915	2,990	0.01	2,946	-0.01	2,872	-0.01	2,915	0.01	2,855	-0.01	2,928	0.01	2,747	-0.03	2,874	0.02	2,862	0.00	2,926	0.01	2,932	0.00	2,879	-0.01	-0.01	-0.08
8.1	2,986	3,022	0.01	2,986	-0.01	3,032	0.01	2,955	-0.01	2,885	-0.01	2,934	0.01	2,868	-0.01	2,875	0.00	2,922	0.01	3,032	0.02	2,967	-0.01	3,005	0.01	0.00	-0.06
9.1	3,125	3,164	0.01	3,181	0.00	3,127	-0.01	3,209	0.02	3,069	-0.03	3,201	0.03	3,110	-0.02	3,042	-0.01	3,032	0.00	3,154	0.02	3,169	0.00	3,180	0.00	0.01	-0.06
10.1	3,326	3,292	-0.01	3,255	-0.01	3,409	0.03	3,298	-0.02	3,272	0.00	3,302	0.01	3,252	-0.01	3,344	0.02	3,186	-0.03	3,255	0.01	3,261	0.00	3,205	-0.01	-0.02	-0.09
11.1	3,947	3,992	0.01	3,939	-0.01	3,883	-0.01	3,963	0.02	4,055	0.02	3,826	-0.04	3,957	0.03	3,995	0.01	3,976	0.00	4,080	0.02	3,938	-0.03	3,942	0.00	0.00	-0.10
12.1	4,193	4,212	0.00	4,338	0.02	4,220	-0.02	4,268	0.01	4,105	-0.03	4,362	0.05	4,297	-0.01	4,317	0.00	4,311	0.00	4,302	0.00	4,351	0.01	4,160	-0.04	-0.01	-0.10
13.1	3,531	3,582	0.01	3,535	-0.01	3,518	0.00	3,574	0.01	3,494	-0.02	3,499	0.00	3,593	0.02	3,457	-0.03	3,659	0.04	3,444	-0.04	3,629	0.04	3,612	0.00	0.02	-0.10
14.1	4,164	3,946	-0.04	4,086	0.03	4,083	0.00	4,016	-0.01	4,036	0.00	4,026	0.00	4,023	0.00	4,092	0.01	4,140	0.01	4,031	-0.02	4,047	0.00	4,094	0.01	-0.01	-0.07
15.1	4,463	4,309	-0.03	4,317	0.00	4,200	-0.02	4,108	-0.02	4,361	0.05	4,267	-0.02	4,295	0.01	4,276	0.00	4,352	0.01	4,247	-0.02	4,368	0.02	4,364	0.00	-0.02	-0.11
16.1	4,044	3,934	-0.02	4,076	0.03	3,998	-0.01	4,030	0.01	4,040	0.00	4,005	-0.01	3,931	-0.01	4,047	0.02	3,936	-0.02	3,925	0.00	3,923	0.00	3,940	0.00	-0.02	-0.08
17.1	3,976	4,006	0.01	3,967	-0.01	4,131	0.03	3,995	-0.03	3,913	-0.02	3,901	0.00	3,953	0.01	3,946	0.00	3,953	0.00	4,004	0.01	3,935	-0.01	3,823	-0.02	-0.03	-0.08
18.1	4,823	4,934	0.02	4,815	-0.02	4,925	0.02	4,921	0.00	4,897	0.00	4,862	-0.01	4,886	0.00	4,904	0.00	4,968	0.01	4,968	0.00	4,888	-0.02	4,811	-0.01	0.00	-0.06
19.1	5,633	5,638	0.00	5,718	0.02	5,505	-0.04	5,922	0.08	5,768	-0.03	5,751	0.00	5,730	0.00	5,750	0.00	5,786	0.01	5,741	-0.01	5,659	-0.02	5,654	0.00	0.00	-0.08
20.1	3,678	4,852		3,806		3,760	-0.01	3,860	0.02	3,674	-0.04	3,854	0.03	3,729	-0.02	3,745	0.00	3,826	0.02	3,720	-0.02	3,826	0.02	3,648	-0.03	-0.03	-0.12
21.1	10,052	10,620		9,976		9,959	-0.01	9,957	0.00	9,932	-0.01	10,013	0.03	9,892	-0.04	10,073	0.06	9,957	-0.04	10,060	0.03	10,068	0.00	9,937	-0.04	-0.01	-0.14
22.1	10,494	9,616		10,629		10,583	-0.02	8,484		10,491	-0.03	10,495	0.00	10,560	0.02	10,553	0.00	10,516	-0.01	10,760	0.08	10,276	-0.16	10,400	0.04	-0.08	-0.22
23.1	8,216			8,471		8,384	-0.03	8,485	0.03	8,524	0.01	8,349	-0.06	8,202	-0.05	8,371	0.06	8,440	0.02	8,326	-0.04	8,323	0.00	8,385	0.02	-0.03	-0.18
23.8												8,571		8,461	-0.04	8,731	0.09	8,701	-0.01	8,883	0.06	8,891	0.00	8,878	0.00	0.10	-0.05

Total change in storage:	-0.32
Total change in storage below ET depth:	-0.15
Total drainage:	-3.75
Total drainage below ET depth:	-1.92
Change in storage within the cap (2 feet)	-0.07

Note: ET depth was set at 4.1 feet to be consistent with previous data analysis. The ET depth will be evaluated after four years of data are available.

a. Under the date, there are two columns. The first column is the neutron probe counts. The second column shows the change in moisture content from the previous month.

Table G-6. Summary of landfill cover NAT and time-domain reflectometer monitoring results.

	Neutron Probe Location					Time-Domain Reflectometer			
	LF2-03	LF2-04	LF2-07	LF3-03	LF3-05	LF3-east	LF3-west	LF2-north	LF2-south
Spring 2001 Infiltration event (in.)									
Infiltration	0.8	1.42	1.19	1.31	1.07	2.12	2.85	3.86	NA
Recharge (2)	<0.25	0.3	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
10/00 to 9/01 Yearly Drainage (in.)									
Total Drainage	3.16	3.62	4.32	3.25	3.75				
Change in Storage from 10/00 to 9/01 (in.)									
Total	-0.01	-0.29	-1.00	-0.24	-0.32	0.07	-0.28	0.76	0.33
Within Cap	--	--	0.01	0.00	-0.07	0.12	-0.09	0.08	-0.35
Within ET Zone	-0.03	-0.16	-0.09	-0.05	-0.17	0.36	-0.11	0.4	-0.14
Below ET Zone	0.02	-0.13	-0.91	-0.19	-0.15	-0.21	-0.21	0.37	0.45

(a) The ET depth is assumed to be 3 to 4 feet. The ET depth can be more reliably determined after 4 years of data are collected.

(b) The amount of recharge is estimated to be the increase in moisture content below ET depth (4 feet).

Table G-7. Precipitation summary for FY 2001.

Month	Precipitation (in.)
October-00	0.98
November-00	0.31
December-00	0.13
January-01	0.36
February-01	0.8
March-01	0.2
April-01	0.68
May-01	0.02
June-01	0.33
July-01	0.2
August-01	0.12
September-01	0.55
Total	4.68
Nov-00 thru Mar-01	1.8

Table G-8. Layer classification for neutron probe measurements.

LF2-07 Depth/Type[a] (ft)	LF2-04 Depth/Type (ft)	LF2-03 Depth/Type (ft)	LF3-05 Depth/Type (ft)	LF3-03 Depth/Type (ft)
0.84C	0.14S	-0.08S	1.1C	0.7C
1.84S	1.14S	0.92S	2.1S	1.7S
2.84S	2.14S	1.92S	3.1S	2.7C
3.84C	3.14S	2.92S	4.1C	3.7S
4.84C	4.14S	3.92S	5.1S	4.7S
5.84C	5.14S	4.92S	6.1S	5.7S
6.84C	6.14S	5.92S	7.1S	6.7S
7.84C	7.14S	6.92S	8.1S	7.7S
8.84S	8.14S	7.92S	9.1S	8.7S
9.84C	9.14S	8.92S	10.1S	9.7S
10.84C	10.14S	9.92S	11.1S	10.7S
11.84C	11.14S	10.92S	12.1S	11.7S
12.84S	12.14S	11.92S	13.1S	12.7S
13.84C	13.14S	12.92S	14.1S	13.7S
14.84C	14.14S	13.92S	15.1S	14.7S
15.84C	15.14S	14.92S	16.1S	15.7S
16.84C	16.14S	15.92S	17.1S	16.7S
17.84C	17.14S	16.92S	18.1S	17.7S
	18.14S	17.92S	19.1S	18.7S
	19.14C	18.92S	20.1S	19.7S
	20.14C	19.92C	21.1C	
	21.14C	20.92C	22.1C	
		21.92C	23.1C	
			23.8C	

a. Type is either S =Sand and Gravel; or C = Clay or silt.

Table G-9. Infiltration and recharge calculations for neutron probe measurements in spring 2001.

	LF2-3		Change MC		Change MC			Infiltration Recharge - Increase event (in.) below ET depth (in.)	
Depth	2/28/2001	3/15/2001	3/15–2/28	3/28/2001	3/28–2/28	4/18/2001	5/17/2001	2/28–3/28	2/28/01–5/17/01
0	1818[a]	3721	0.18	3003	0.11	2789	2094	0.11	
0.92	3448	6526	0.59	6221	0.53	5913	4968	0.53	
1.92	3098	3722	0.12	4500	0.27	4504	4213	0.27	
2.92	3233	3182	-0.01	3250	0.01	3339	3316		
3.92	3239	3198	-0.01	3223	0.00	3211	3196		
4.92	3266	3343	0.01	3320	0.00	3308	3376		0.02
5.92	3570	3585	0.00	3466	-0.02	3456	3581		0.00
								0.92	**0.02**

	LF2-4		Change MC		Change MC			Infiltration Recharge - Increase event (in.) below ET depth (in.)	
Depth	2/28/2001	3/15/2001	3/15–2/28	3/28/2001	3/28–2/28	4/18/2001	5/17/2001	2/28–/15	2/28/01–5/17/01
0.14	5254	5587	0.03	4980	-0.03	4763	2829	0.03	
1.14	2863	4785	0.37	4328	0.28	4253	3534	0.37	
2.14	3060	4650	0.31	4238	0.23	4090	3849	0.31	
3.14	3231	4503	0.24	4281	0.20	4085	3910	0.24	
4.14	3419	4803	0.27	4285	0.17	3966	3916	0.27	
5.14	3798	4780	0.19	4591	0.15	4428	4392	0.19	0.11
6.14	3494	3578	0.02	4313	0.16	4163	4147	0.02	0.13
7.14	3667	3699	0.01	3817	0.03	3906	4007	0.01	0.07
								1.43	**0.30**

Table G-9. (continued).

	LF2-07		Change MC		Change MC			Infiltration event (in.)	Recharge - Increase below ET depth (in.)
Depth	2/28/2001	3/15/2001	3/15–2/28	3/28/2001	3/28–2/28	4/18/2001	5/17/2001	2/28–3/28	2/28/01–5/17/2001
	903	89		96		91	79		
-0.16	4526	5151		3465		3237	2257		
0.84	4390	7056	0.90	7801	1.15	7423	6806	1.15	
1.84	3851	3825	0.00	3944	0.02	4157	4136	0.02	
2.84	4689	4688	0.00	4829	0.03	4720	4795		
3.84	5800	5869	0.02	5831	-0.01	5875	5861		
4.84	5114	5100	0.00	5094	0.00	5064	5310		0.04
5.84	4945	5083	0.05	5038	-0.02	4810	4911		-0.01
								1.17	**0.03**

	LF3-03		Change MC		Change MC			Infiltration event (in.)	Recharge - Increase below ET depth (in.)
Depth	2/28/2001	3/15/2001	3/15–2/28	3/28/2001	3/28–2/28	4/18/2001	5/17/2001	2/28–3/28	2/28/01–5/17/2001
	360	75		64		58	52		
-0.3	3791	1965		1420		1182	678		
0.7	3848	7638	1.28	7136	1.11	6860	5394	1.11	
1.7	4719	4681	-0.01	5672	0.18	5745	5523	0.18	
2.7	4092	4278	0.06	4159	0.02	4235	4328	0.02	
3.7	3020	3023	0.00	3038	0.00	3083	3085		
4.7	2942	2922	0.00	2872	-0.01	2952	2973		0.01
5.7	2932	2837	-0.02	3050	0.04	2939	2992		0.01
								1.31	**0.02**

Table G-9. (continued).

	LF3-05		Change MC		Change MC			Infiltration event (in.)	Recharge - Increase below ET depth (in.)
Depth	2/28/2001	3/15/2001	3/15–2/28	3/28/2001	3/28–2/28	4/18/2001	5/17/2001	2/28–3/28	2/28/01–5/17/2001
	1379	142		132		110	91		
0.1	4623	7790	0.38	6734	0.25	6443	4631	0.25	
1.1	3728	5765	0.69	6175	0.82	6032	5554	0.82	
2.1	3781	3716	-0.01	3723	-0.01	3732	3704		
3.1	4159	4165	0.00	4179	0.00	4232	4201		
4.1	5811	5806	0.00	5919	0.04	5812	5847		0.01
5.1	3970	3965	0.00	4028	0.01	3995	4002		0.01
6.1	2686	2797	0.02	2732	-0.01	2738	2802		0.02
								1.08	**0.04**

a. Data from Oct. 2000 used because readings in February reflect snow buildup on surface.

Table G-10. Depth of wetting front or water penetration from spring 2001 and recharge estimates.

LF2 north Depth (ft)	Moisture content Change >2.5%	Peak change in moisture content[a]	Moisture content increase below 4 ft	LF2 south Depth	Moisture content Change >2.5%	Peak change in moisture content[a]	Moisture content increase below 4 ft
0.0–0.5	Yes	3/13/2001	—	0.0–0.5	Yes	---[3]	—
0.5–1.0	Yes	3/23/2001	—	0.5–1.0	Yes	4/17/2001	—
1.0–1.5	Yes	4/5/2001	—	1.0–1.5	Yes	5/29/2001	—
1.5–2.0	Yes	6/11/2001	—	1.5–2.0	No	NA	—
2.0–2.5	Yes	7/6/2001	—	2.0–2.5	No	NA	—
2.5–3.0	Yes	7/6/2001	—	2.5–3.0	No	NA	—
3.0–3.5	No	NA[2]	—	3.0–3.5	No	NA	—
3.5–4.0	No	NA	—	3.5–4.0	No	NA	—
4.0–4.5	Yes	9/10/2001	0.16	4.0–4.5	No	NA	—
4.5–5.0	No	NA	—	4.5–5.0	Yes	8/18/2001	0.17
5.0–5.5	No	NA	—	5.0–5.5	No	NA	—
5.5–6.0	No	NA	—	5.5–6.0	No	NA	—
6.0–6.5	No	NA	—	6.0–6.5	No	NA	—
6.5–7.0	No	NA	—	6.5–7.0	No	NA	—
7.0–7.5	No	NA	—	7.0–7.5	No	NA	—
7.5–8.0	No	NA	—	7.5–8.0	No	NA	—
LF3-east Depth	Moisture content Change >2.5%	Peak change in moisture content[a]	Moisture content Increase below 4 ft	LF3-west Depth	Moisture content Change >2.5%	Peak change in moisture content[a]	Moisture content Increase below 4 ft
0.0–0.5	Yes	3/17/2001	—	0.0–0.5	Yes	3/19/2001	—
0.5–1.0	Yes	3/23/2001	—	0.5–1.0	Yes	3/21/2001	—
1.0–1.5	Yes	7/12/2001	—	1.0–1.5	Yes	4/30/2001	—
1.5–2.0	Yes	7/19/2001	—	1.5–2.0	No	NA	—
2.0–2.5	Yes	7/31/2001	—	2.0–2.5	Yes	7/9/2001	—
2.5–3.0	No	NA	—	2.5–3.0	No	NA	—
3.0–3.5	No	NA	—	3.0–3.5	No	NA	—
3.5–4.0	No	NA	—	3.5–4.0	No	NA	—
4.0–4.5	No	NA	—	4.0–4.5	No	NA	—
4.5–5.0	No	NA	—	4.5–5.0	No	NA	—
5.0–5.5	No	NA	—	5.0–5.5	No	NA	—
5.5–6.0	No	NA	—	5.5–6.0	No	NA	—
6.0–6.5	No	NA	—	6.0–6.5	No	NA	—
6.5–7.0	No	NA	—	6.5–7.0	No	NA	—
7.0–7.5	No	NA	—	7.0–7.5	No	NA	—
7.5–8.0	No	NA	—	7.5–8.0	No	NA	—

a. Spring snowmelt started about the 7th of March. Peak change in moisture content dates are approximates.

b. NA = Not Applicable

c. Peak probably occurred when probe was not functioning.

Table G-11. TDR infiltration and recharge calculations for 2001.[a]

		Infiltration			Drainage		
		Moisture content		Change in moisture	Moisture content		Change in moisture
LF3-west		11/5/2001	4/1/2001	content (in.)	4/1/2001	9/10/2001	content (in.)
	0.0–0.5	0.162	0.267	0.63	0.267	0.0549	1.2726
	0.5–1.0	0.064	0.317	1.518	0.317	0.0647	1.5138
	1.0–1.5	0.163	0.2799	0.7014	0.2799	0.1695	0.6624
			Total	2.8494		Total	3.4488

Recharge—No intervals below 4 feet with an increase in moisture content greater than 2.5%.

		Moisture content		Change in moisture	Moisture content		Change in moisture
LF3-east		11/5/2001	4/1/2001	content (in.)	4/1/2001	9/10/2001	content (in.)
	0.0–0.5	0.116083	0.227	0.6655	0.227	0.042	1.11
	0.5–1.0	0.139125	0.363917	1.34875	0.363917	0.1592	1.2283
	1.0–1.5	0.198083	0.216125	0.10825	0.216125	0.2314	-0.09165
			Total	2.1225		Total	2.24665

Recharge—No intervals below 4 feet with an increase in moisture content greater than 2.5%.

		Moisture content		Change in moisture	Moisture content		Change in Moisture
LF2-north		12/6/2001	4/1/2001	content (in.)	4/1/2001	9/10/2001	content (in.)
	0.0–0.5	0.16	0.316625	0.93975	0.316625	0.1099	1.24035
	0.5–1.0	0.053333	0.35075	1.7845	0.35075	0.0639	1.7211
	1.0–1.5	0.093444	0.282	1.131333333	0.282	0.1361	0.8754
			Total	3.855583333		Total	3.83685

Recharge—Intervals below 4 feet showing greater than 2.5% increase in moisture content.

		Moisture content		Change in moisture	Moisture content		Change in Moisture
LF2-north		NA	NA	content (in.)	2/28/2001	9/10/2001	content (in.)
	4.0–4.5	—	—	—	0.126	0.153	0.162
						Total	0.16

		Moisture content		Change in moisture	Moisture content		Change in moisture
LF2-south(3)		NA	NA	content (in.)	NA	NA	content (in.)
	0.0–0.5	—	—	—	—	—	—
	0.5–1.0	—	—	—	—	—	—
	1.0–1.5	—	—	—	—	—	—
		—	Total	—	—	Total	—

Recharge—Intervals below 4 feet showing greater than 2.5% increase in moisture content.

		Moisture content		Change in moisture	Moisture content		Change in moisture
LF2-south		NA	NA	content (in.)	2/28/2001	8/18/2001	content (in.)
	4.5–5.0	—	—		0.118	0.146	0.168
						Total	0.17

a. Infiltration calculations are for the spring, because this was the only time of year that moisture infiltration was noted beyond a 1-ft depth.

b. Soil moisture contents at beginning of freeze (approx. November 5, 2000, and after thaw April 1, 2001).

c. The surface probe for this array was not functioning from February 15, 2001, to March 22, 2001.

Table G-12. Water balance for time-domain reflectometer arrays.

LF2-North	11/1/2000	9/30/2001	Change in Water Content[a] 0–8 feet	4–8 feet	0–2 feet	LF2-South	11/1/2000	9/30/2001	Change in Water Content[a] 0–8 feet	4–8 feet	0–2 feet
0.0–0.5	0.1776	0.123917	-0.3221		-0.3221	0.0–0.5	0.1075	0.06575	-0.2505		-0.2505
0.5–1.0	0.054	0.063625	0.05775		0.05775	0.5–1.0	0.083	0.091083	0.0485		0.0485
1.0–1.5	0.091	0.130208	0.23525		0.23525	1.0–1.5	0.126	0.131833	0.035		0.035
1.5–2.0	0.081	0.098667	0.106		0.106	1.5–2.0	0.106	0.075292	-0.18425		-0.18425
2.0–2.5	0.149	0.1625	0.081			2.0–2.5	0.0565	0.080792	0.14575		
2.5–3.0	0.066	0.095917	0.1795			2.5–3.0	0.008	0.012542	0.02725		
3.0–3.5	0.0096	0.011625	0.01215			3.0–3.5	0.011	0.017625	0.03975		
3.5–4.0	0.046	0.05225	0.0375			3.5–4.0	0.153	0.15625	0.0195		
4.0–4.5	0.121667	0.145609	0.143652	0.143652		4.0–4.5	0.1825	0.191792	0.05575	0.05575	
4.5–5.0	0.125	0.129478	0.02687	0.02687		4.5–5.0	0.1165	0.141583	0.1505	0.1505	
5.0–5.5	0.053	0.049826	-0.01904	-0.01904		5.0–5.5	0.1525	0.154375	0.01125	0.01125	
5.5–6.0	0.144	0.150696	0.040174	0.040174		5.5–6.0	0.222	0.224958	0.01775	0.01775	
6.0–6.5	0.117	0.133708	0.10025	0.10025		6.0–6.5	0.156	0.165958	0.05975	0.05975	
6.5–7.0	0.115	0.125375	0.06225	0.06225		6.5–7.0	0.084	0.094625	0.06375	0.06375	
7.0–7.5	0.194	0.196375	0.01425	0.01425		7.0–7.5	0.102	0.114667	0.076	0.076	
7.5–8.0	0.148	0.148792	0.00475	0.00475		7.5–8.0	0.216	0.218542	0.01525	0.01525	
		Totals	0.760202	0.373152	0.0769			Totals	0.331	0.45	-0.35125

LF3-East	9/27/2000	9/30/2001	Change in Water Content[a] 0–8 feet	4–8 feet	0–2 feet	LF3-West	9/27/2000	9/30/2001	Change in Water Content[a] 0–8 feet	4–8 feet	0–2 feet
0.0–0.5	0.066	0.05175	-0.0855		-0.0855	0.0–0.5	0.0685	0.072083	0.0215		0.0215
0.5–1.0	0.1458	0.16	0.0852		0.0852	0.5–1.0	0.0786	0.072435	-0.03699		-0.03699
1.0–1.5	0.213	0.23	0.102		0.102	1.0–1.5	0.1739	0.167958	-0.03565		-0.03565
1.5–2.0	0.107	0.109708	0.01625		0.01625	1.5–2.0	0.1119	0.105565	-0.03801		-0.03801
2.0–2.5	0.1678	0.197417	0.1777			2.0–2.5	0.2076	0.22125	0.0819		
2.5–3.0	0.0736	0.0815	0.0474			2.5–3.0	0.1136	0.12225	0.0519		
3.0–3.5	0.2181	0.213542	-0.02735			3.0–3.5	0.0552	0.042208	-0.07795		
3.5–4.0	0.2321	0.227375	-0.02835			3.5–4.0	0.1593	0.15275	-0.0393		
4.0–4.5	0.1123	0.105542	-0.04055	-0.04055		4.0–4.5	0.1045	0.110667	0.037	0.037	
4.5–5.0	0.1538	0.14425	-0.0573	-0.0573		4.5–5.0	0.0582	0.048875	-0.05595	-0.05595	
5.0–5.5[b]	0.1462	0.145	-0.0072	-0.0072		5.0–5.5	0.1042	0.100083	-0.0247	-0.0247	
5.5–6.0[b]	0.1601	0.155	-0.0306	-0.0306		5.5–6.0	0.0952	0.092458	-0.01645	-0.01645	
6.0–6.5	0.1159	0.119875	0.02385	0.02385		6.0–6.5	0.1226	0.113125	-0.05685	-0.05685	
6.5–7.0	0.0866	0.07225	-0.0861	-0.0861		6.5–7.0	0.0692	0.075625	0.03855	0.03855	
7.0–7.5	0.0928	0.092417	-0.0023	-0.0023		7.0–7.5	0.03	0.013417	-0.0995	-0.0995	
7.5–8.0	0.1235	0.121208	-0.01375	-0.01375		7.5–8.0	0.0637	0.058625	-0.03045	-0.03045	
		Totals	0.0734	-0.21395	0.11795			Totals	-0.28095	-0.20835	-0.08915

a. Change in water content is equal to change in moisture content multiplied by the 6-in. length of each time-domain reflectometer segment.
b. Values from Aug. 18 and Aug. 22 used for 5–5.5 and 5.5–6 ft segments because of shift in data.

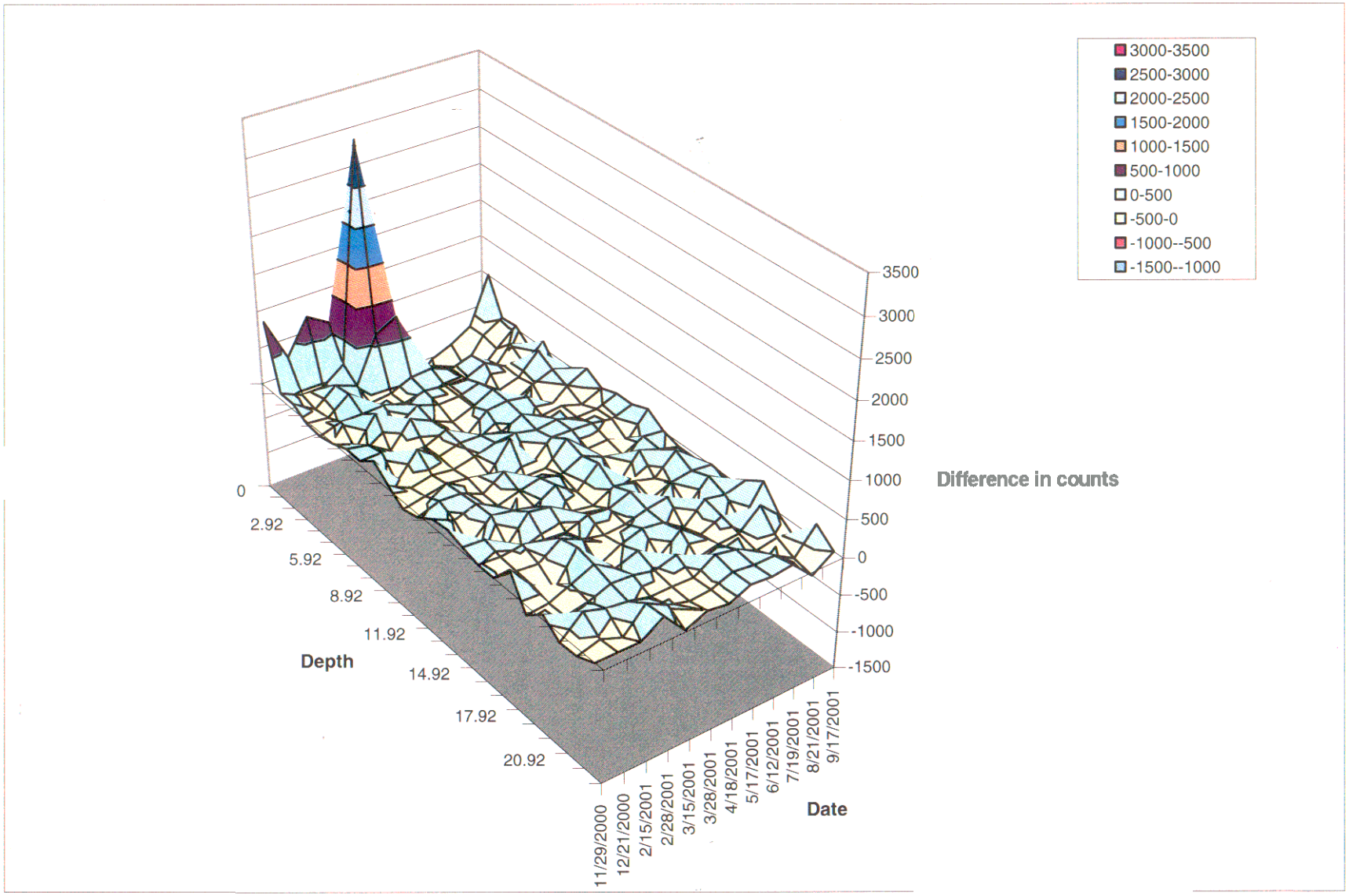

Figure G-1. Neutron probe measurements for LF 2-03.

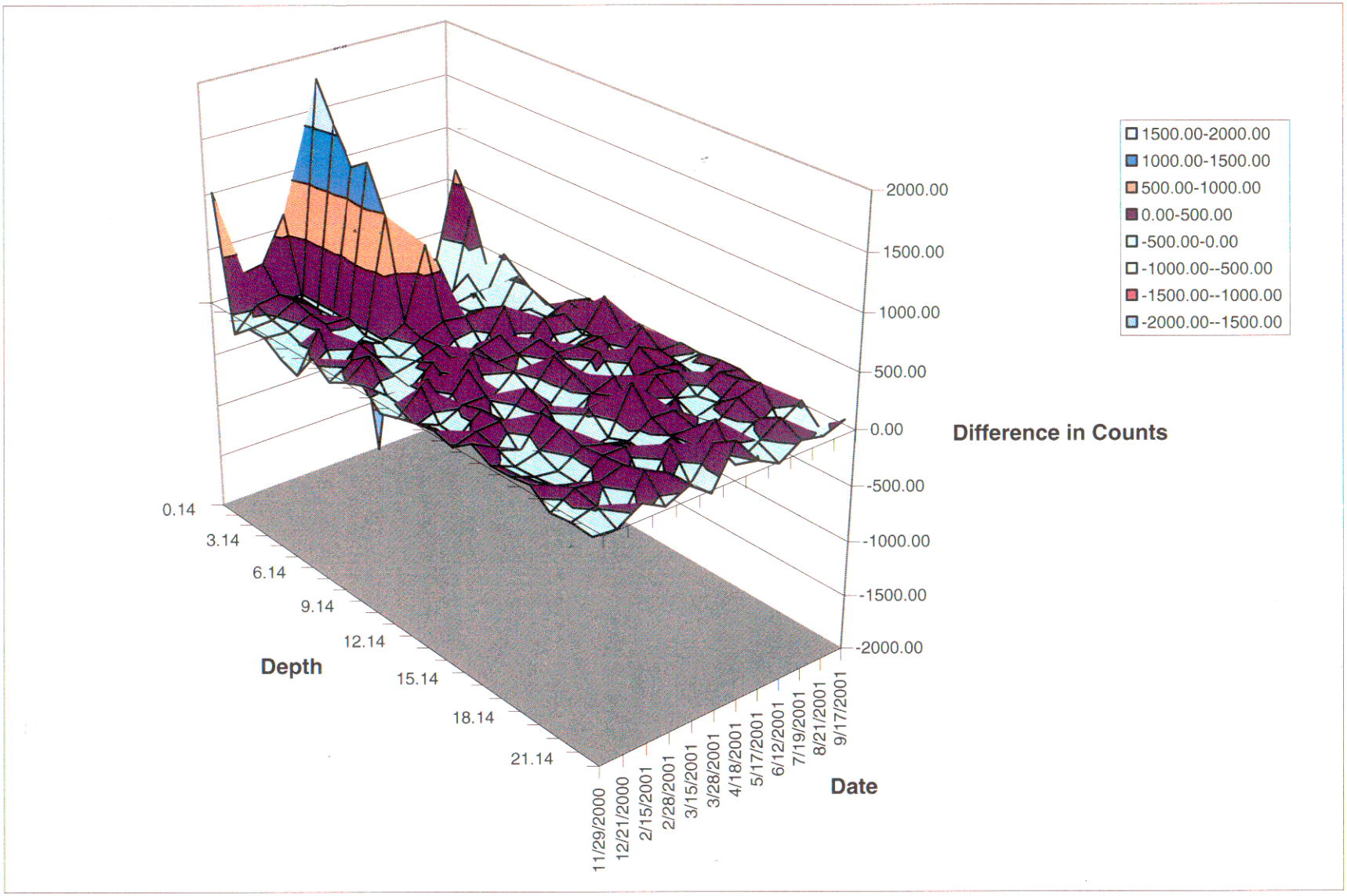

Figure G-2. Neutron probe measurements for LF 2-04.

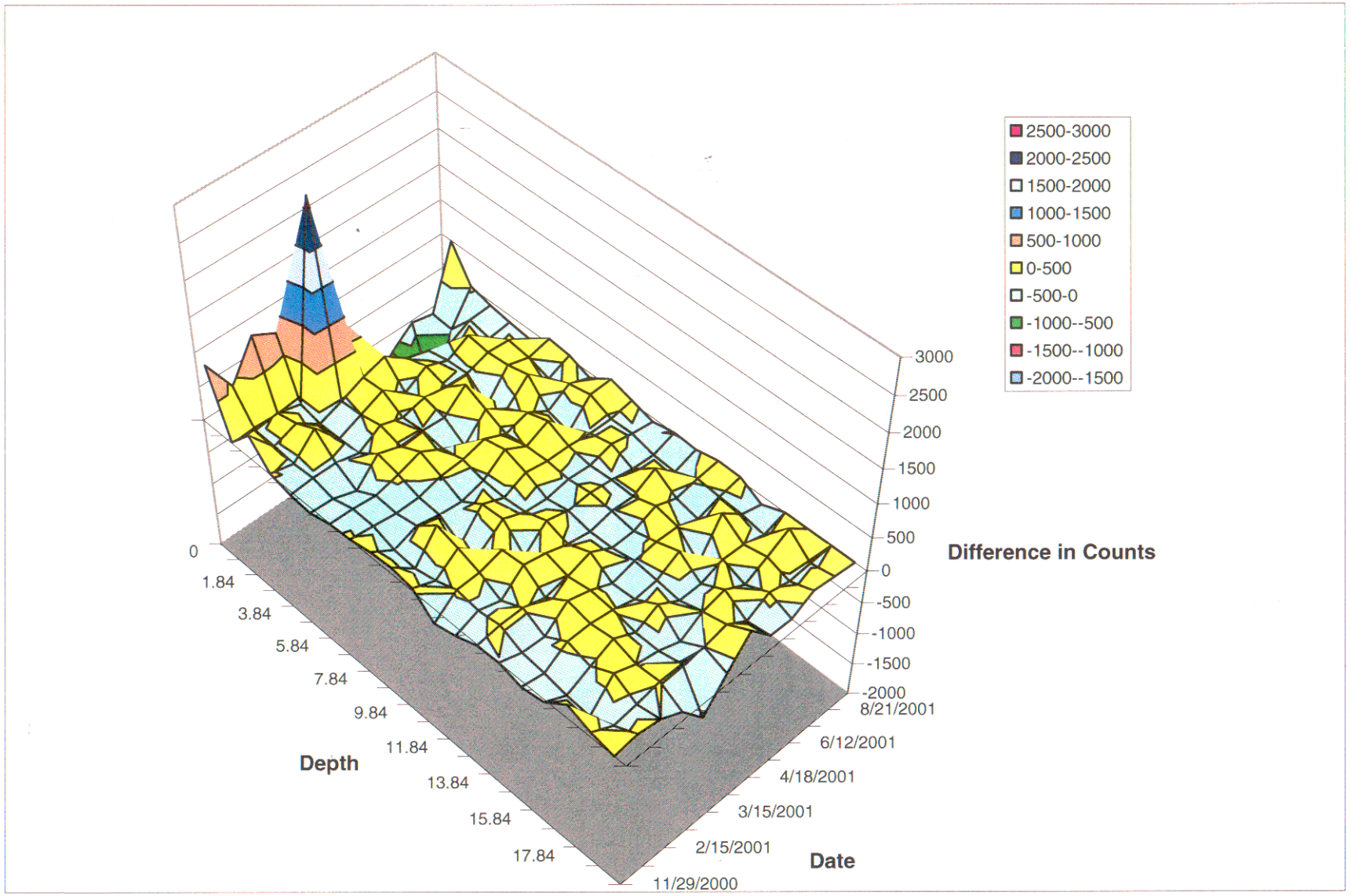

Figure G-3. Neutron probe measurements for LF 2-07.

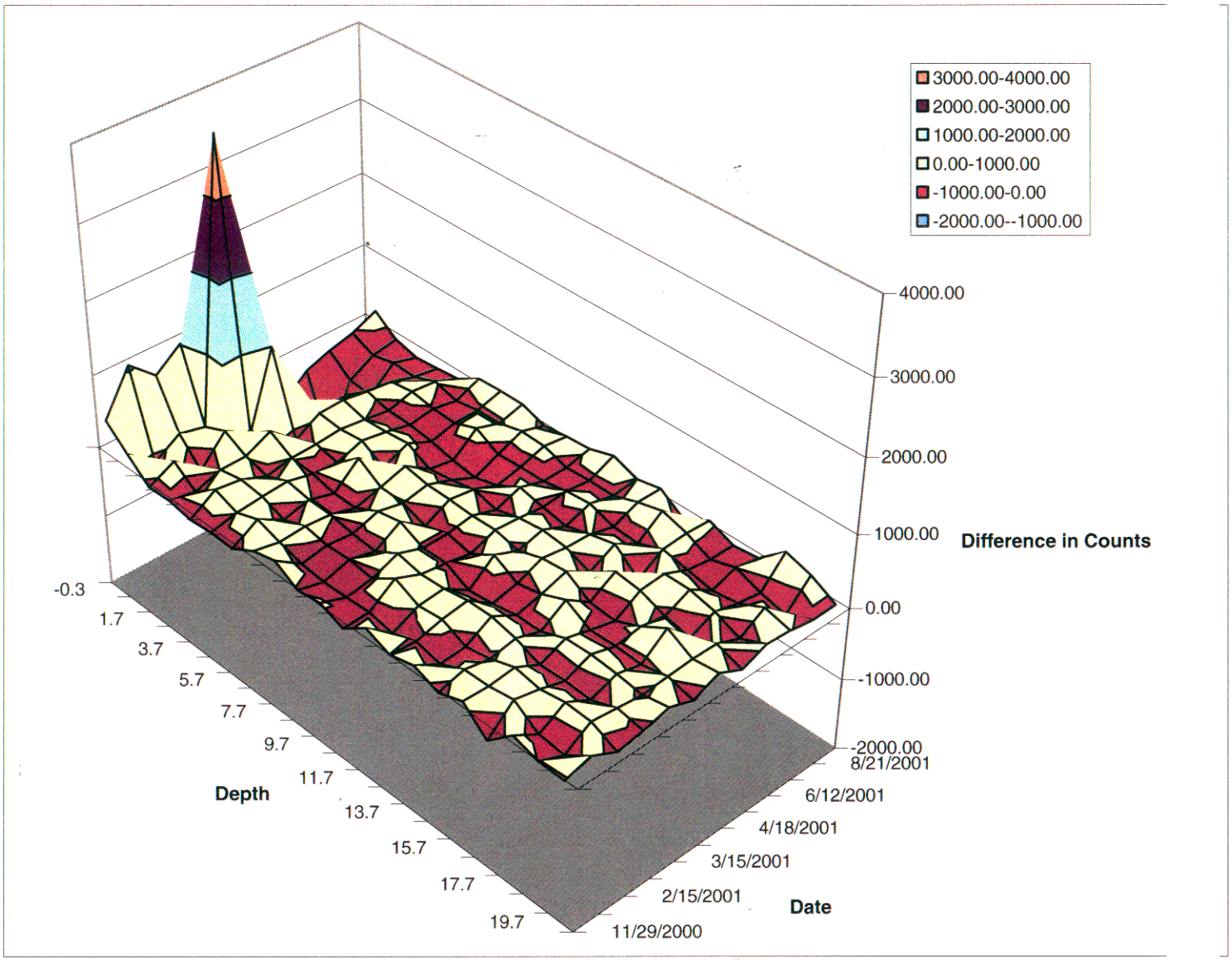

Figure G-4. Neutron probe measurements for LF 3-03.

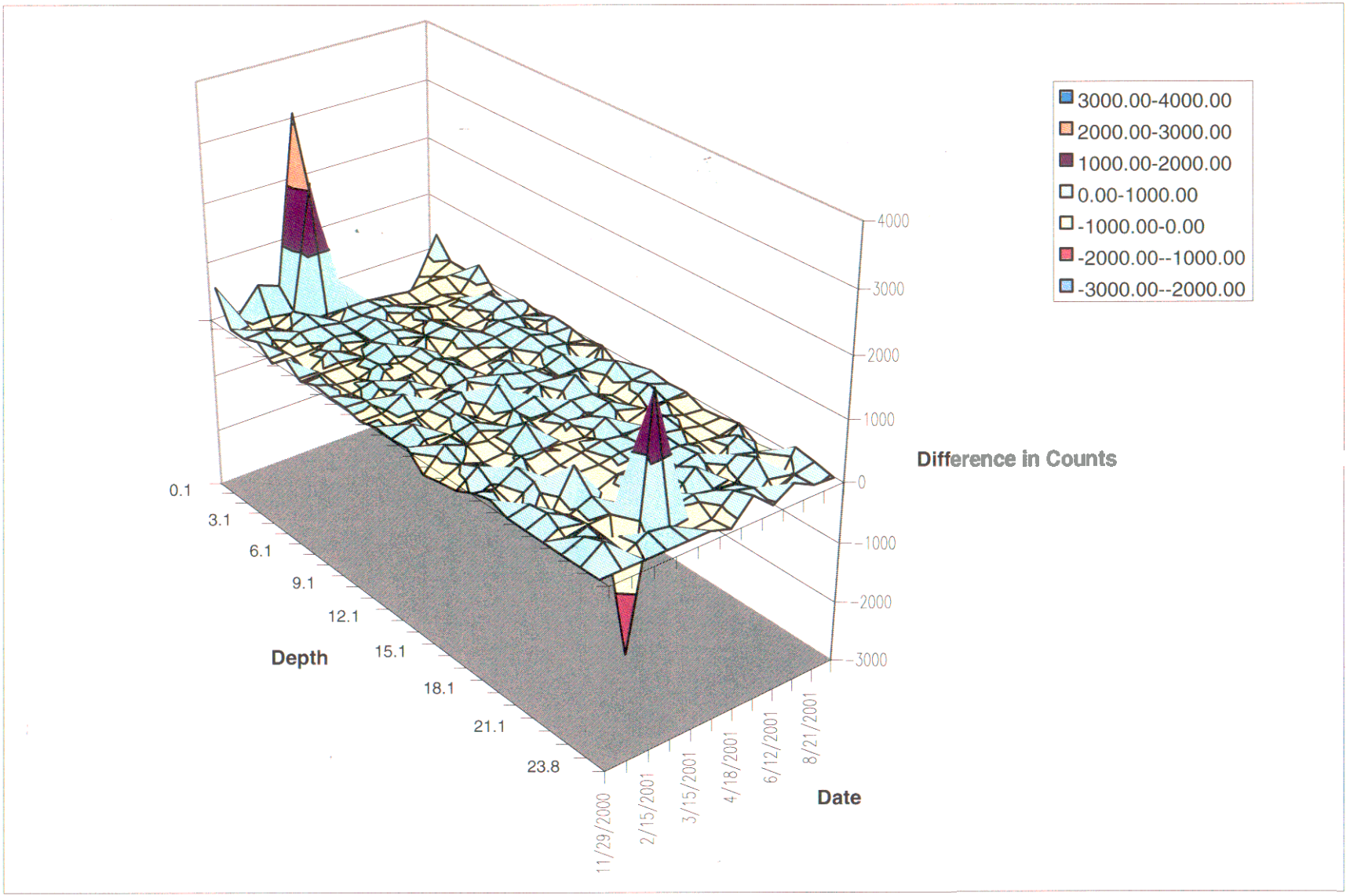

Figure G-5. Neutron probe measurements for LF 3-05.

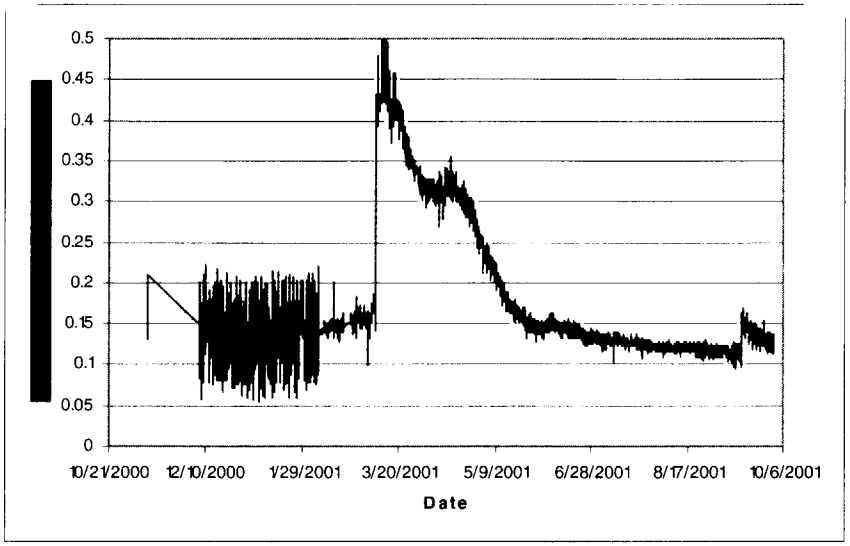

Figure G-6. LF 2-north 0 to 0.5 ft.

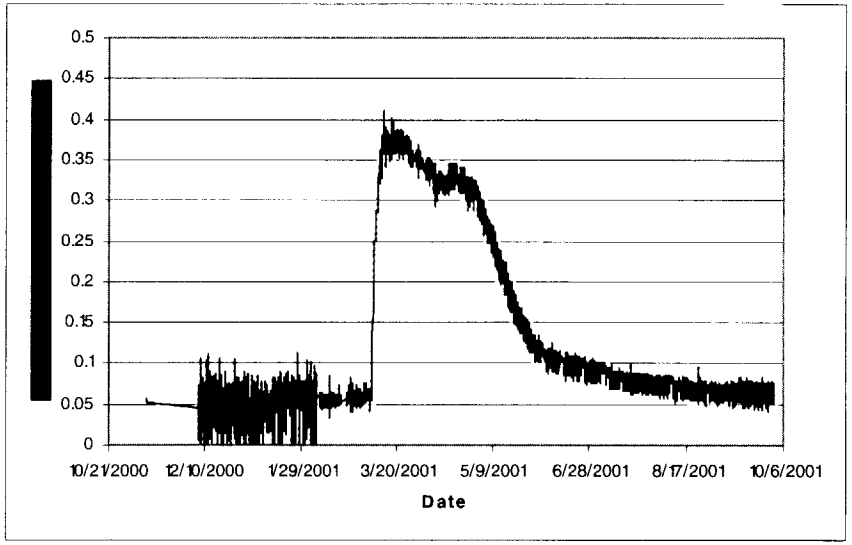

Figure G-7. LF 2-north 0.5 to 1.0 ft.

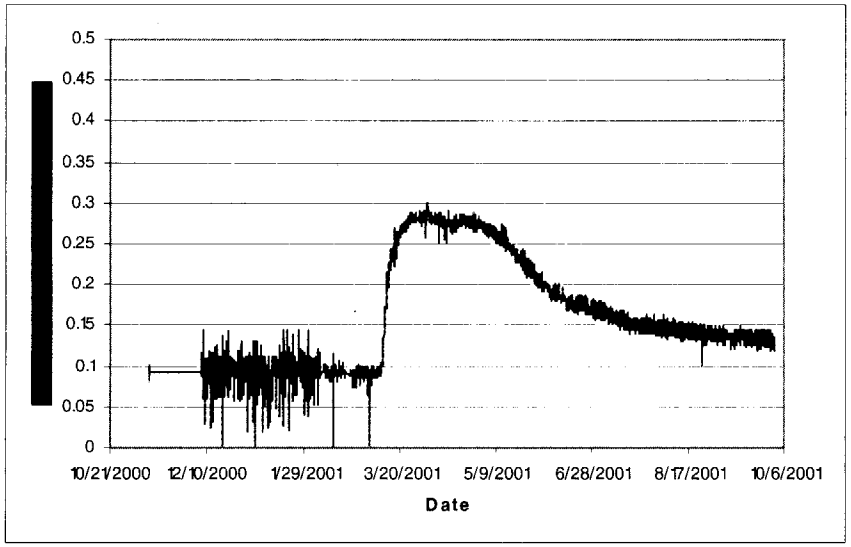

Figure G-8. LF 2-north 1.0 to 1.5 ft.

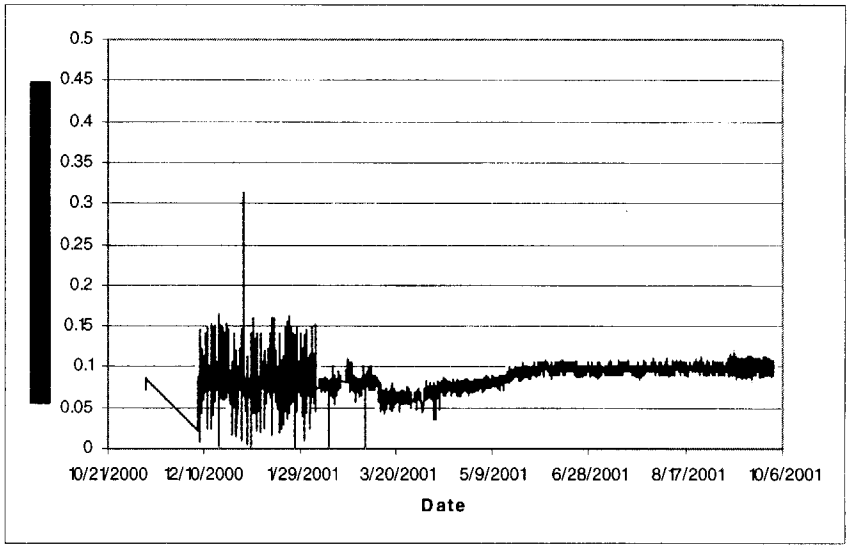

Figure G-9. LF 2-north 1.5 to 2.0 ft.

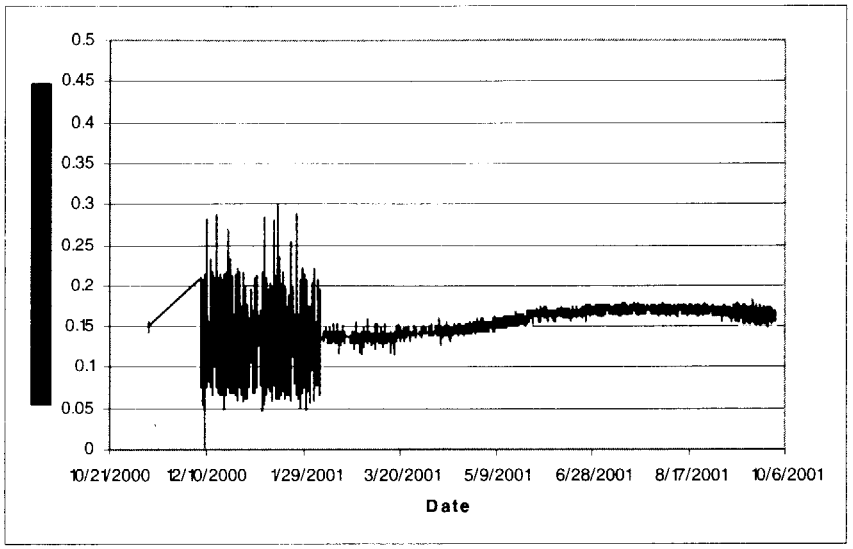

Figure G-10. LF 2-north 2.0 to 2.5 ft.

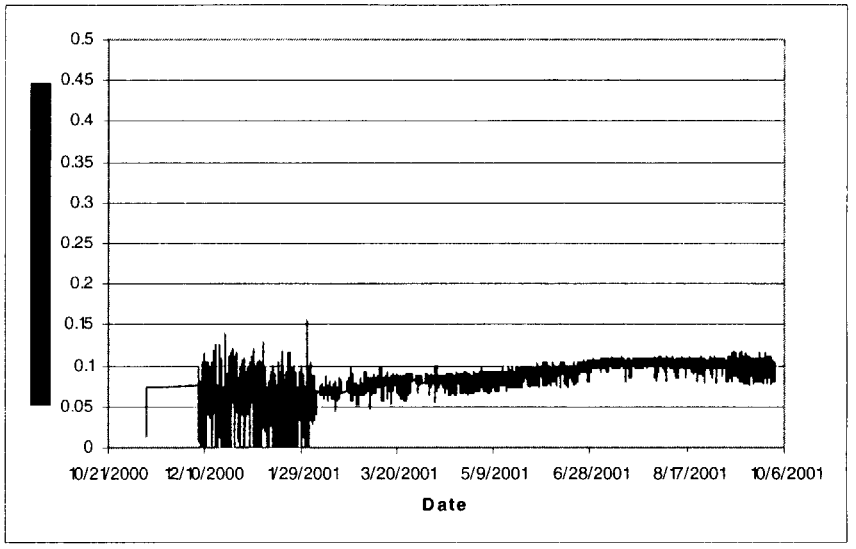

Figure G-11. LF 2-north 2.5 to 3.0 ft.

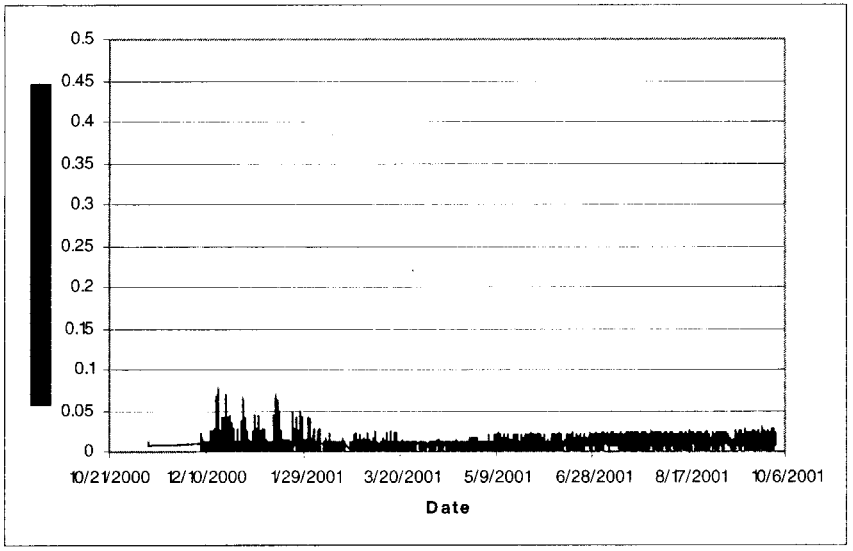

Figure G-12. LF 2-north 3.0 to 3.5 ft.

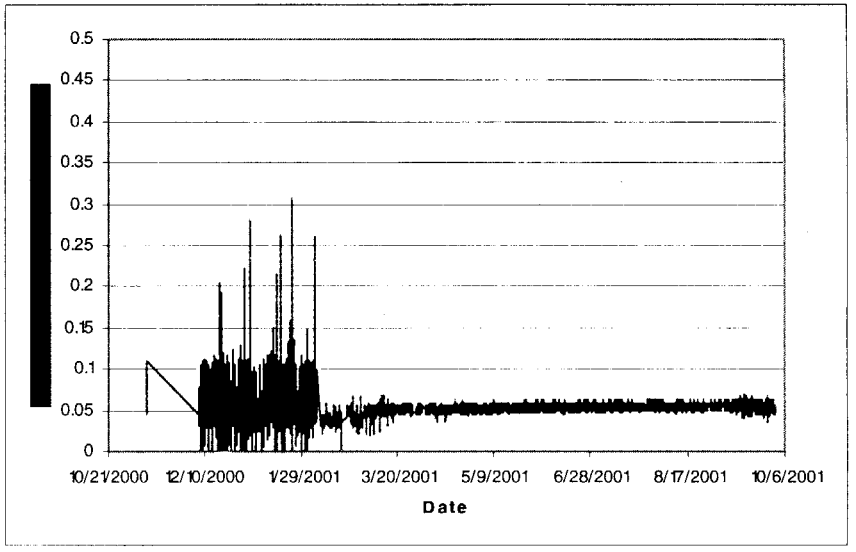

Figure G-13. LF 2-north 3.5 to 4.0 ft.

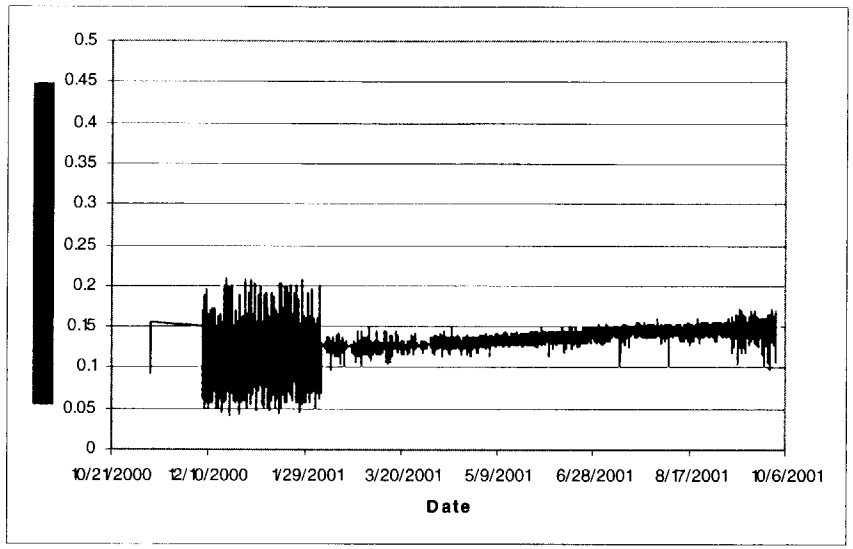

Figure G-14. LF 2-north 4.0 to 4.5 ft.

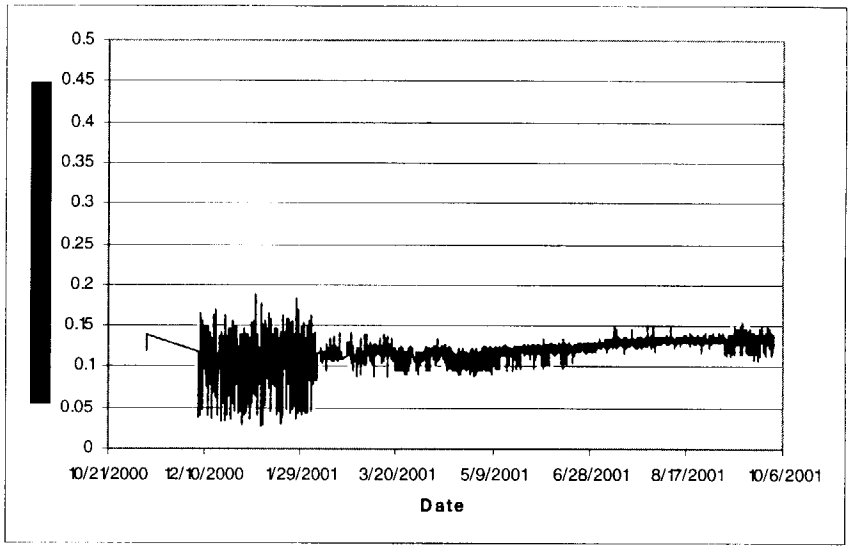

Figure G-15. LF 2-north 4.5 to 5.0 ft.

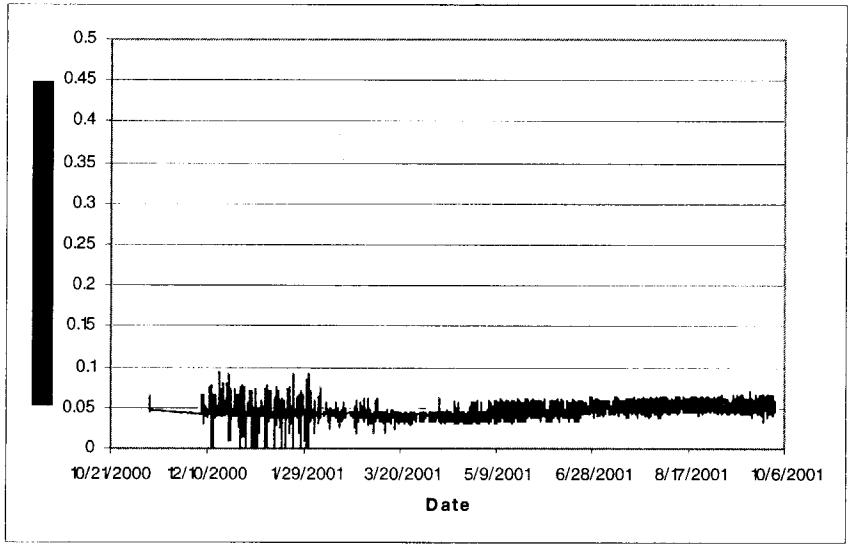

Figure G-16. LF 2-north 5.0 to 5.5 ft.

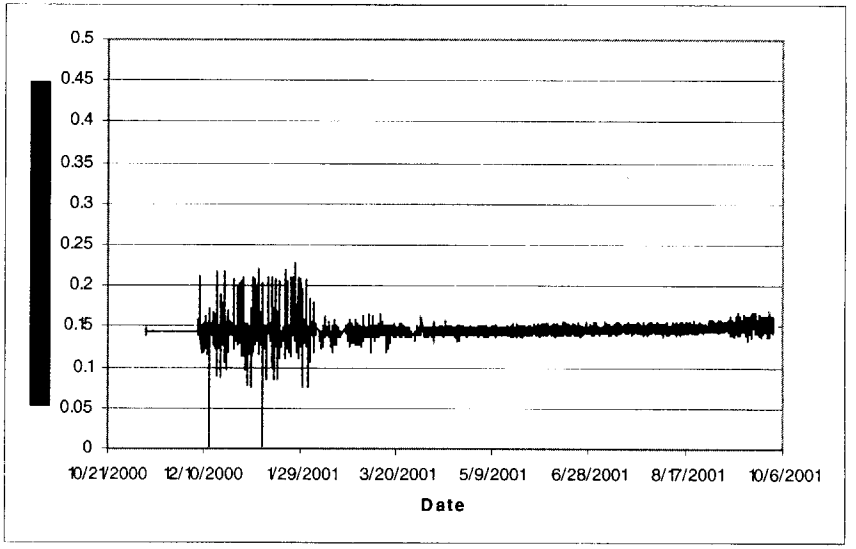

Figure G-17. LF 2-north 5.5 to 6.0 ft.

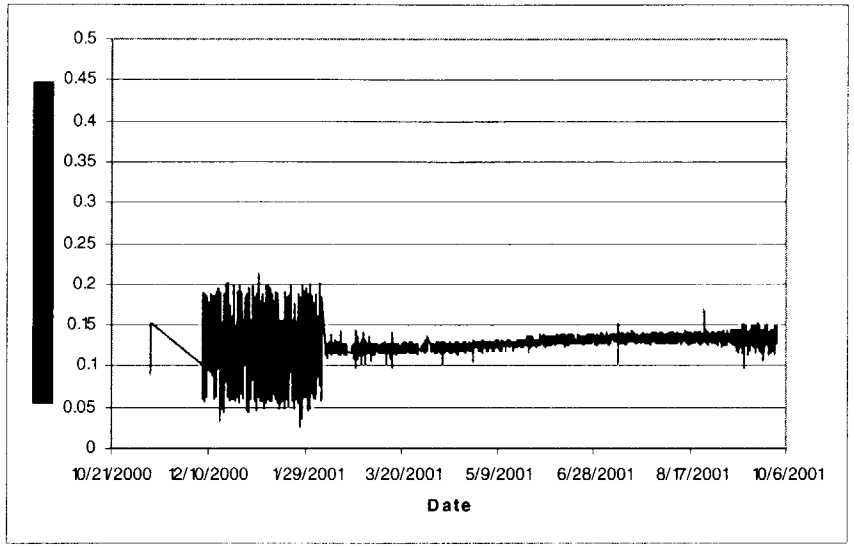

Figure G-18. LF 2-north 6.0 to 6.5 ft.

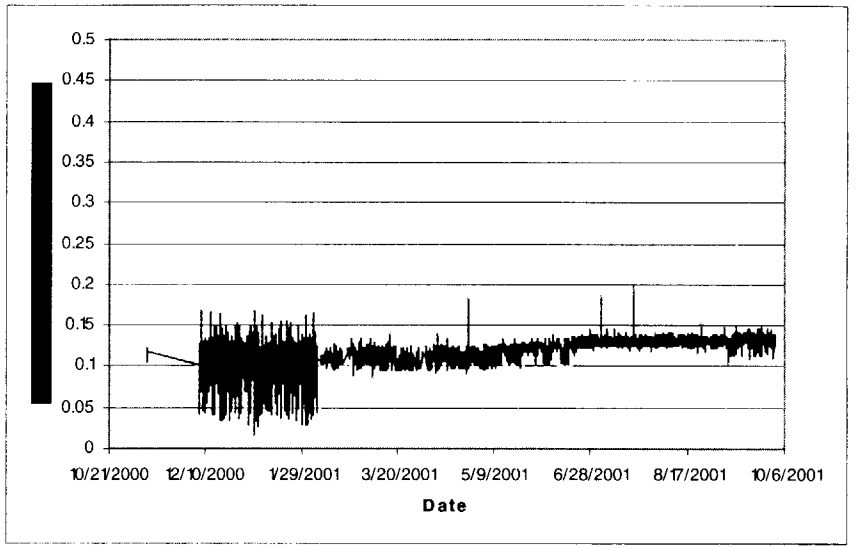

Figure G-19. LF 2-north 6.5 to 7.0 ft.

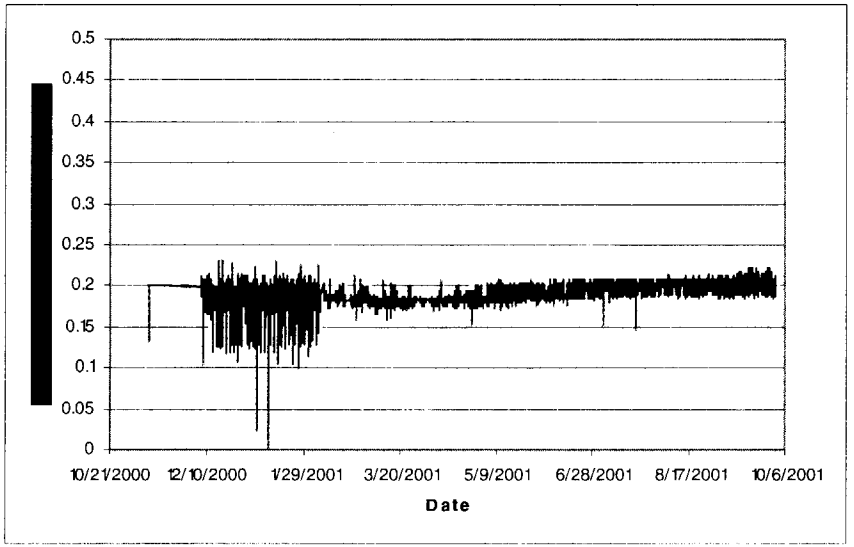

Figure G-20. LF 2-north 7.0 to 7.5 ft.

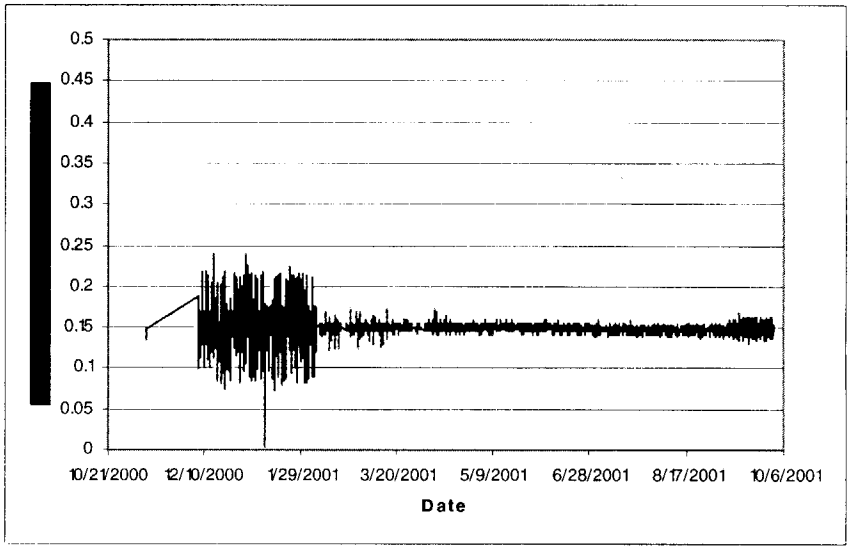

Figure G-21. LF 2-north 7.5 to 8.0 ft.

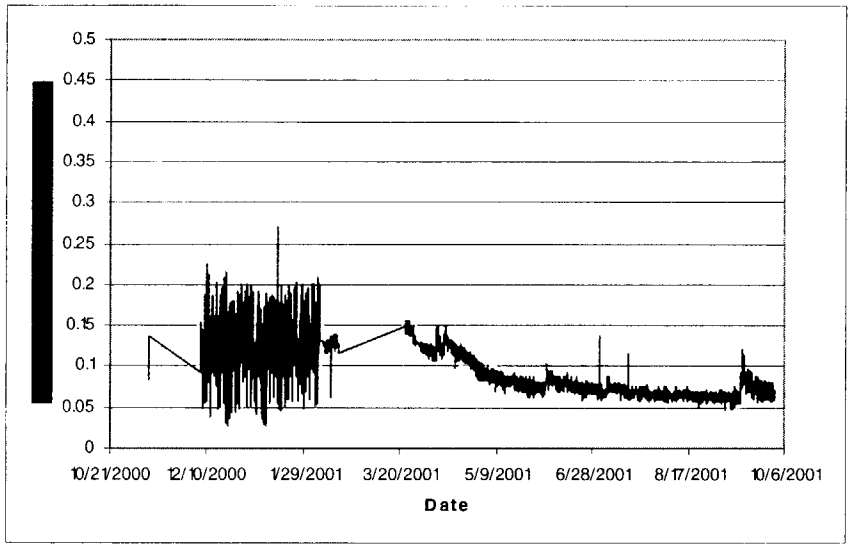

Figure G-22. LF 2-south 0.0 to 0.5 ft.

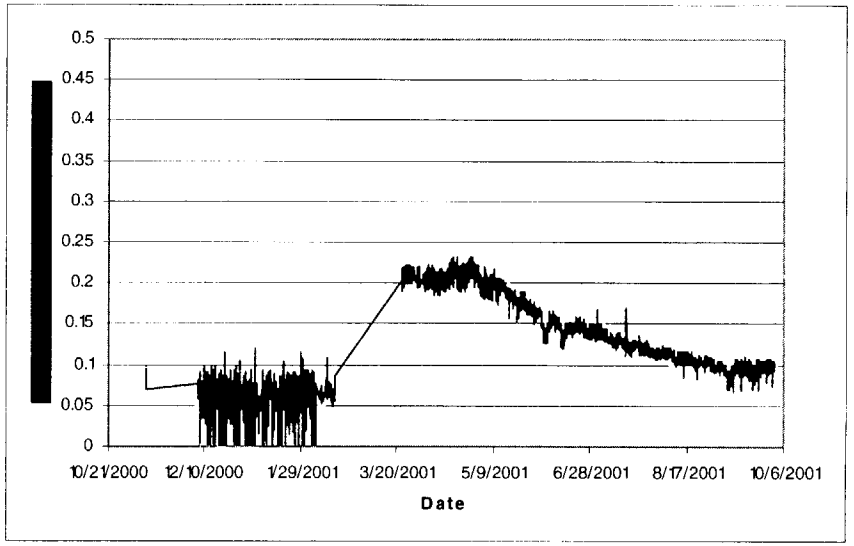

Figure G-23. LF 2-south 0.5 to 1.0 ft.

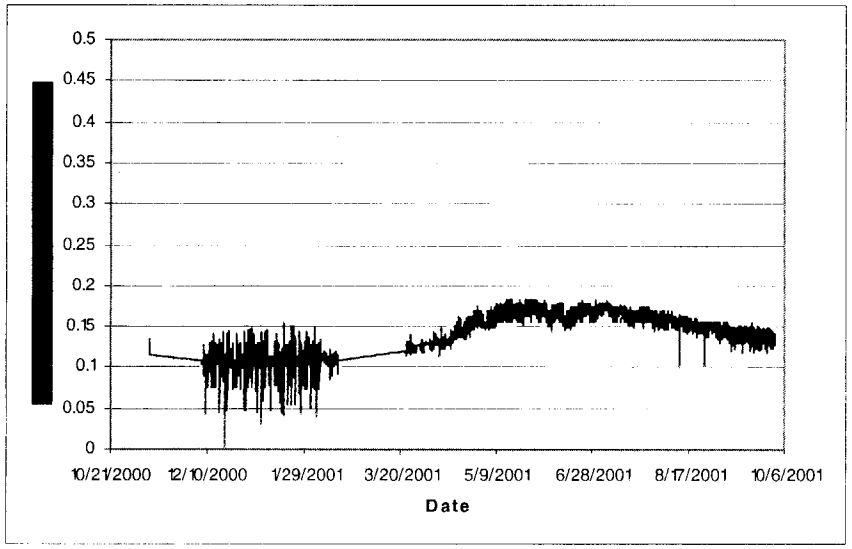

Figure G-24. LF 2-south 1.0 to 1.5 ft.

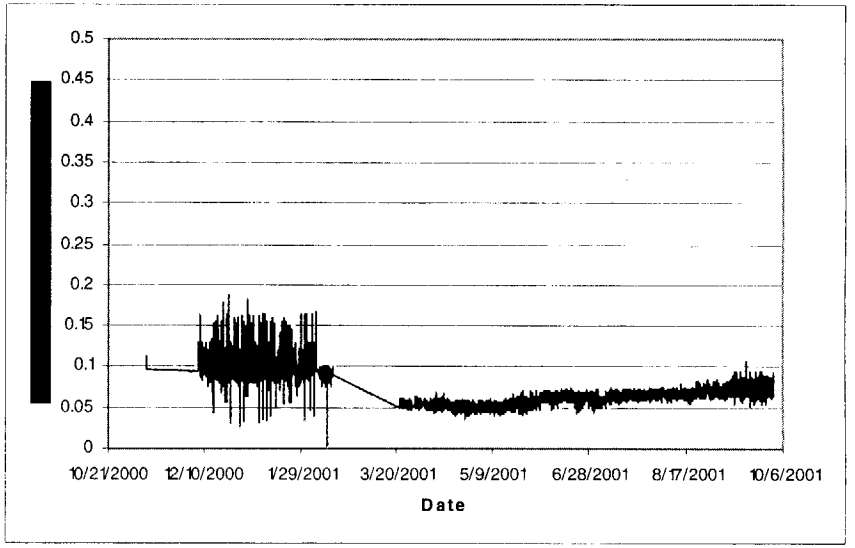

Figure G-25. LF 2-south 1.5 to 2.0 ft.

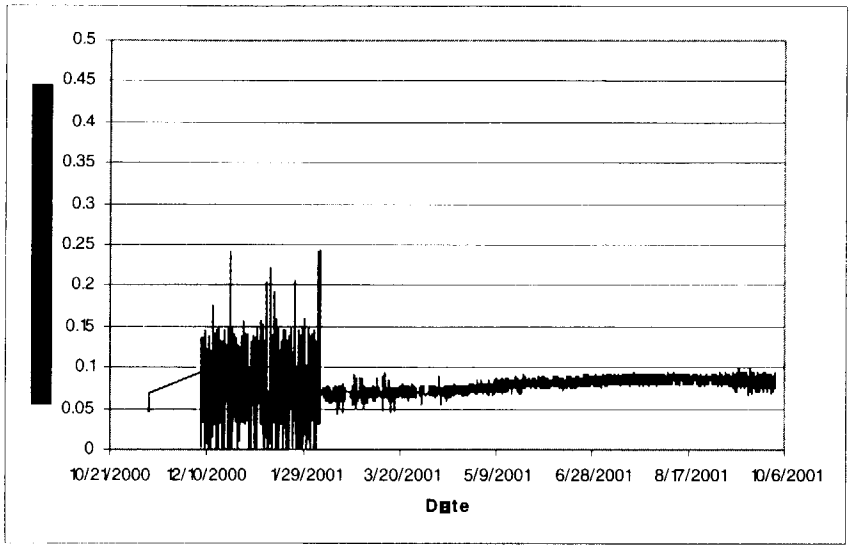

Figure G-26. LF 2-south 2.0 to 2.5 ft.

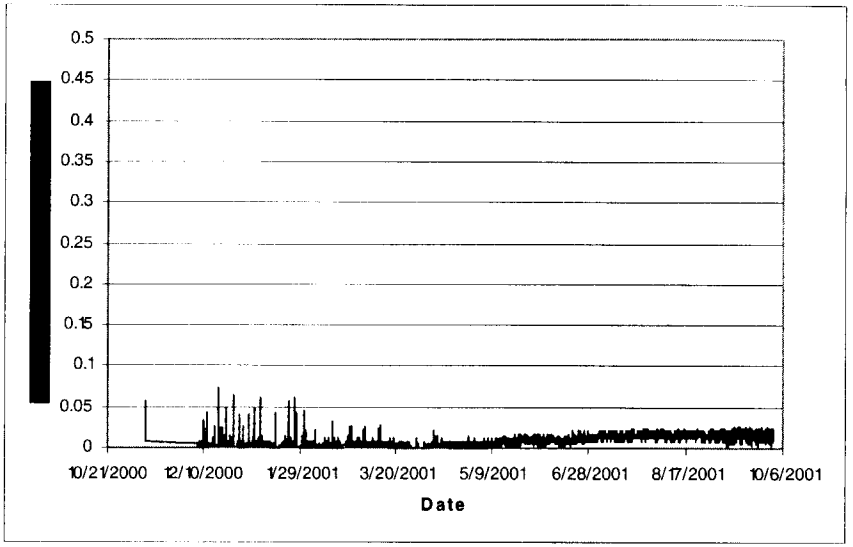

Figure G-27. LF 2-south 2.5 to 3.0 ft.

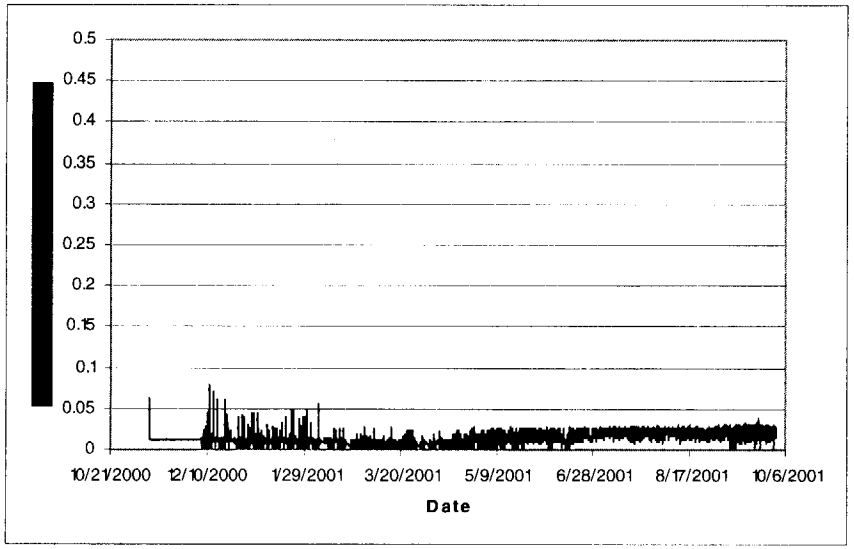

Figure G-28. LF 2-south 3.0 to 3.5 ft.

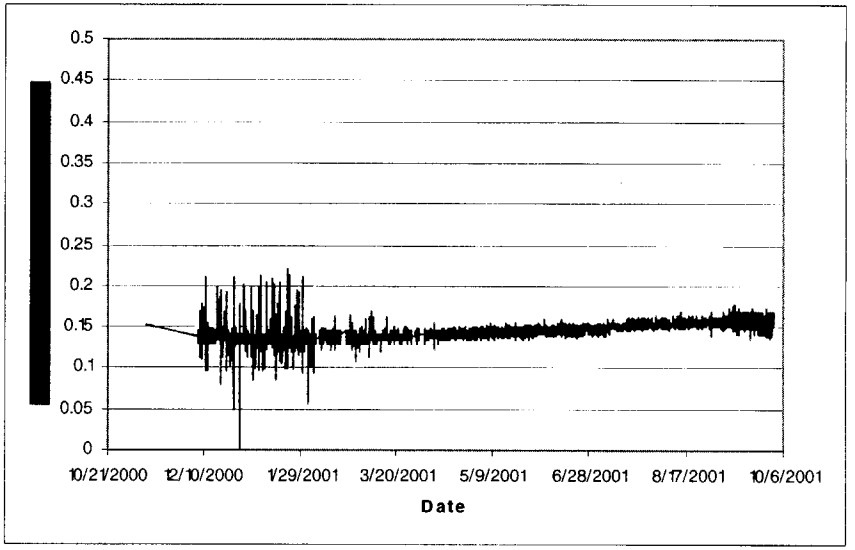

Figure G-29. LF 2-south 3.5 to 4.0 ft.

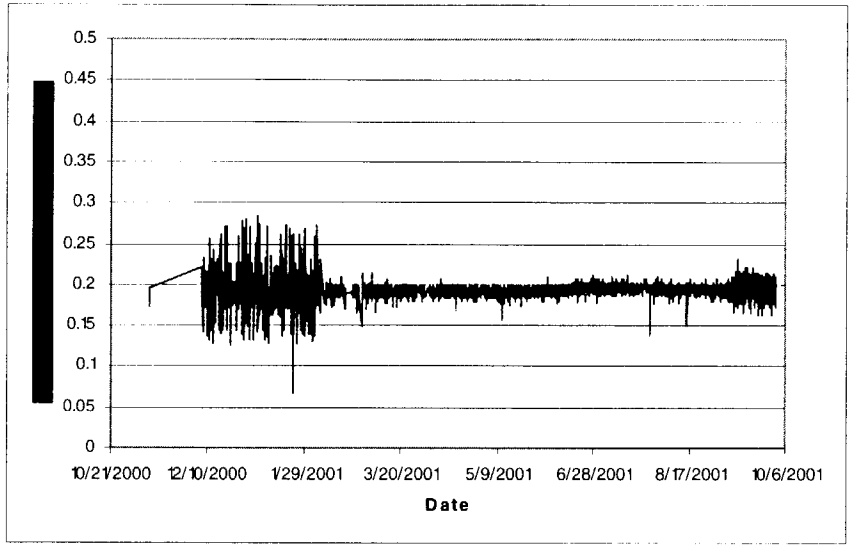

Figure G-30. LF 2-south 4.0 to 4.5 ft.

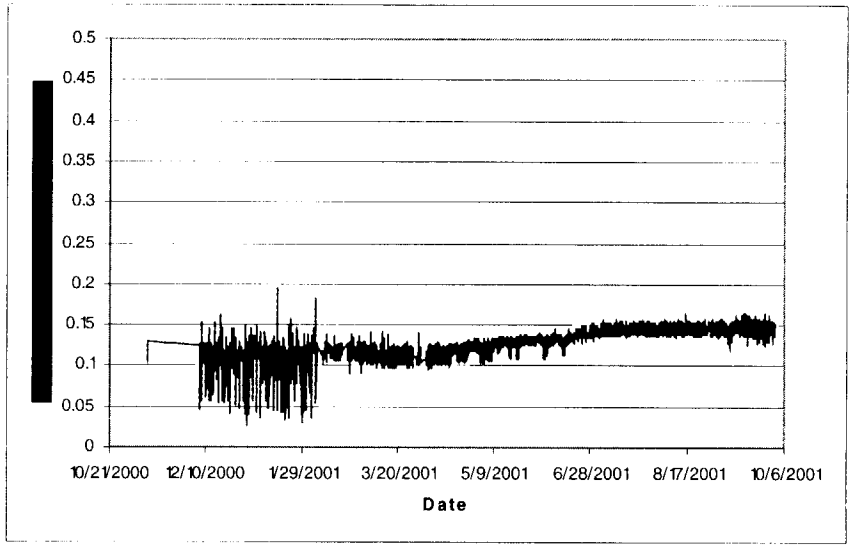

Figure G-31. LF 2-south 4.5 to 5.0 ft.

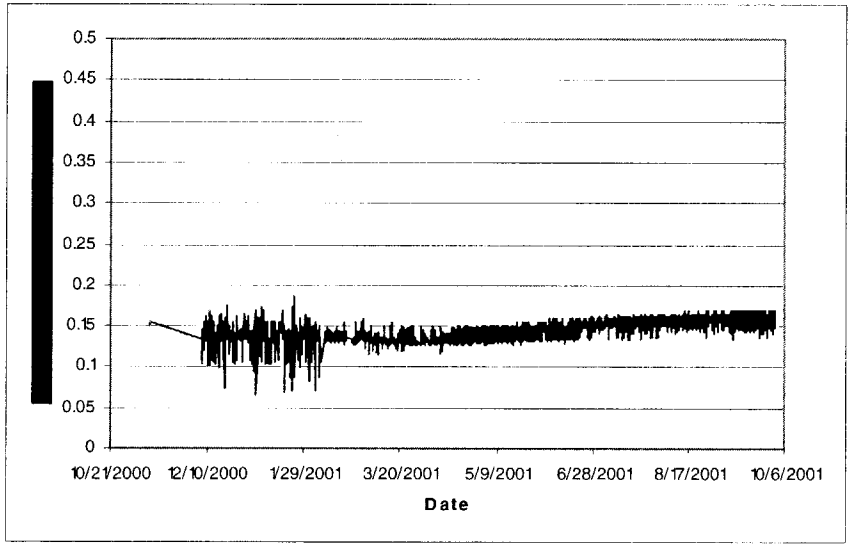

Figure G-32. LF 2-south 5.0 to 5.5 ft.

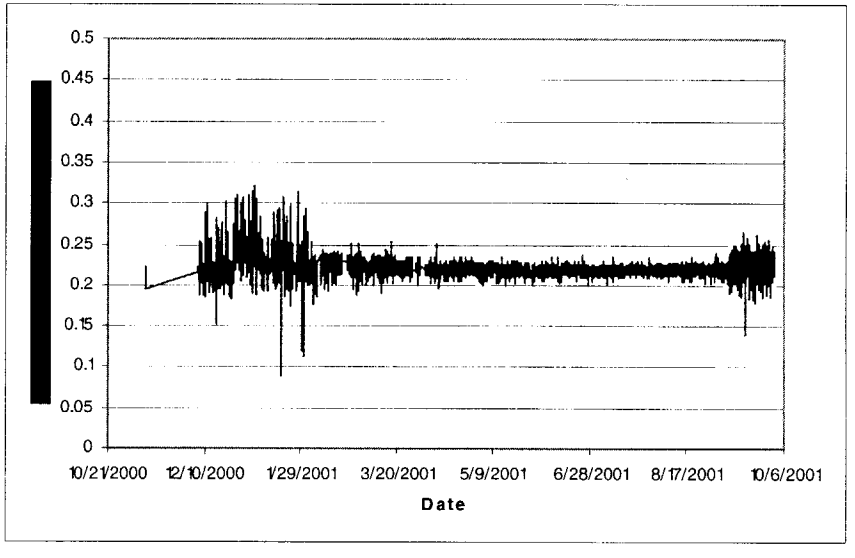

Figure G-33. LF 2-south 5.5 to 6.0 ft.

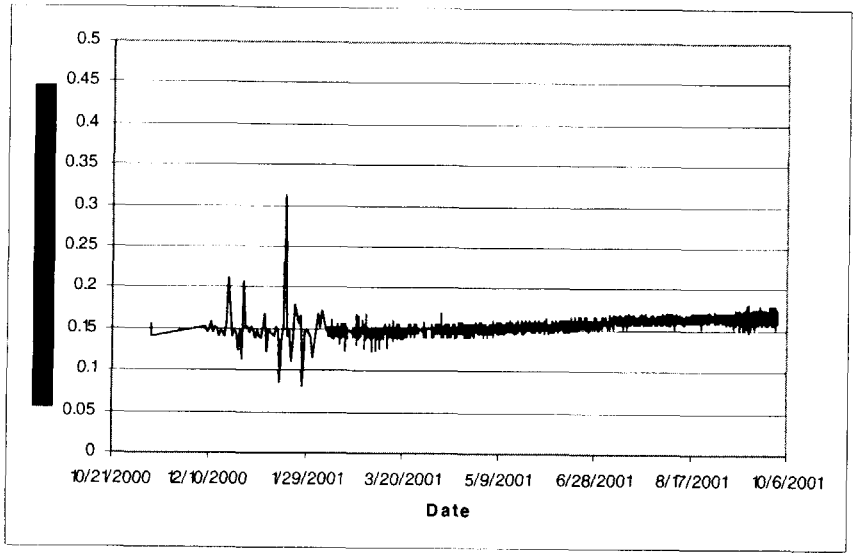

Figure G-34. LF 2-south 6.0 to 6.5 ft.

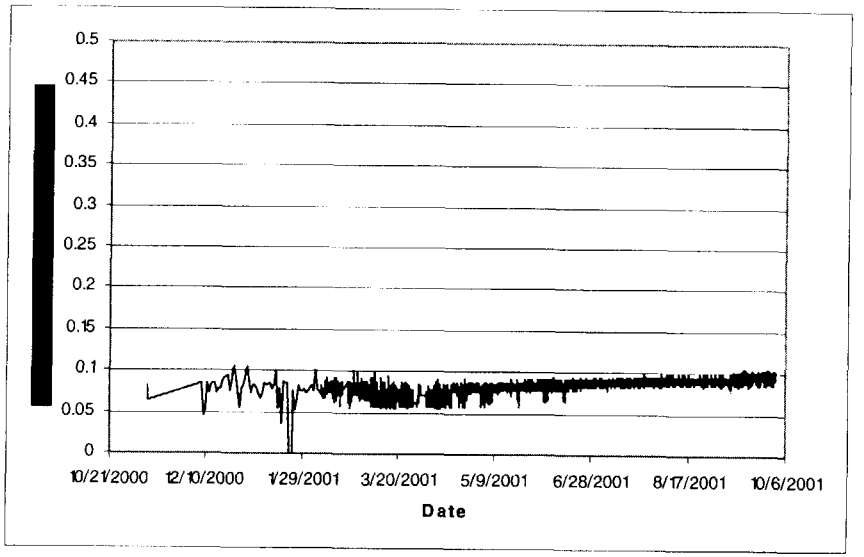

Figure G-35. LF 2-south 6.5 to 7.0 ft.

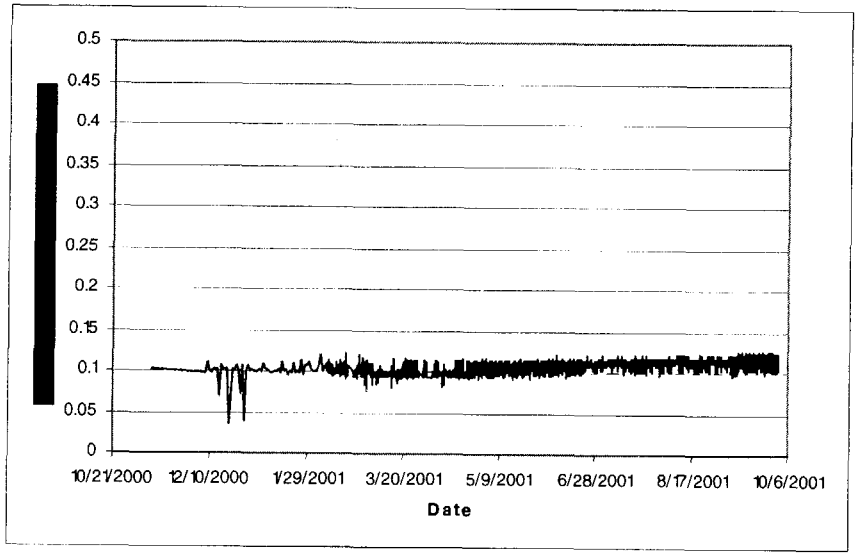

Figure G-36. LF 2-south 7.0 to 7.5 ft.

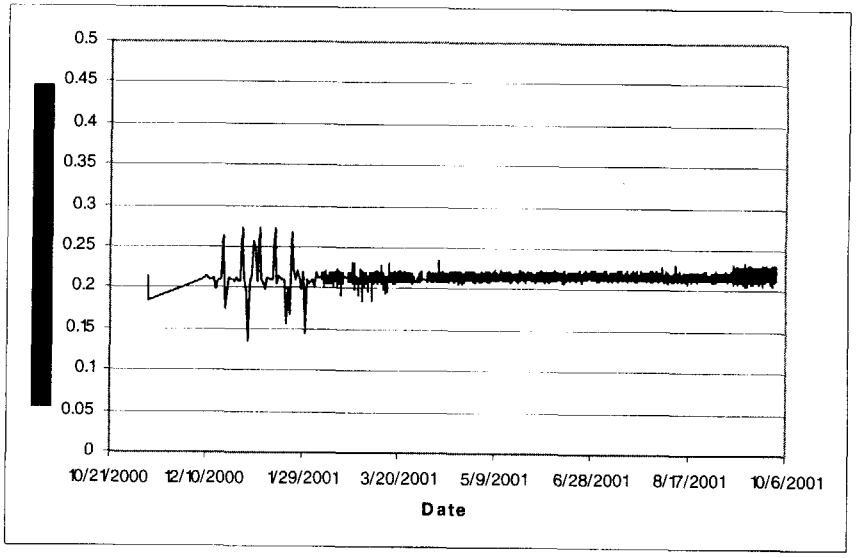

Figure G-37. LF 2-south 7.5 to 8.0 ft.

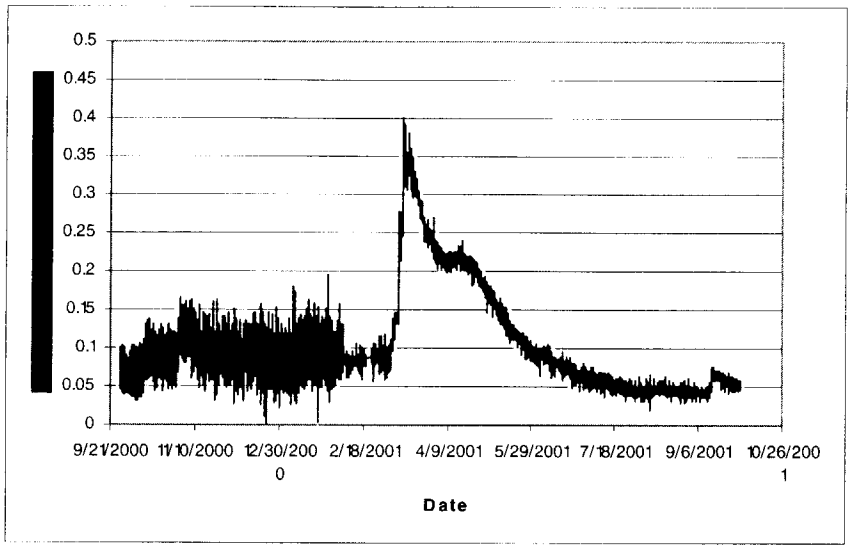

Figure G-38. LF 3-east 0.0 to 0.5 ft.

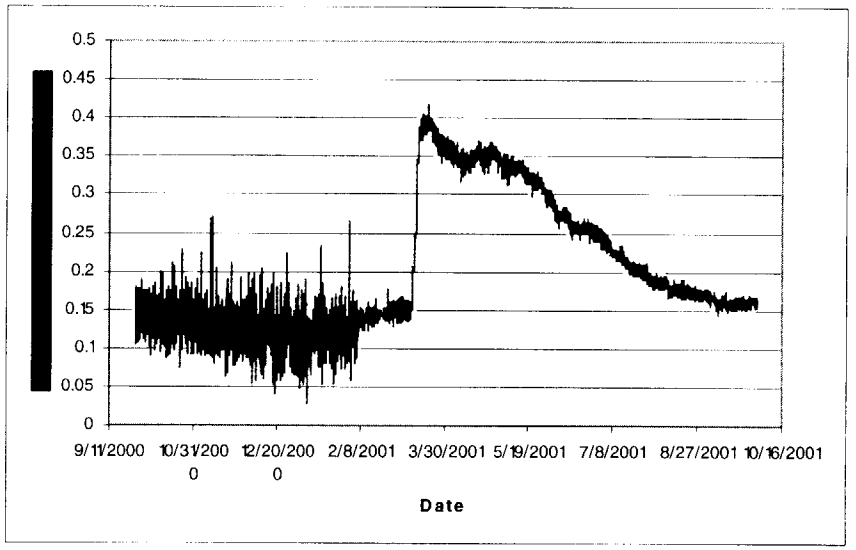

Figure G-39. LF 3-east 0.5 to 1.0 ft.

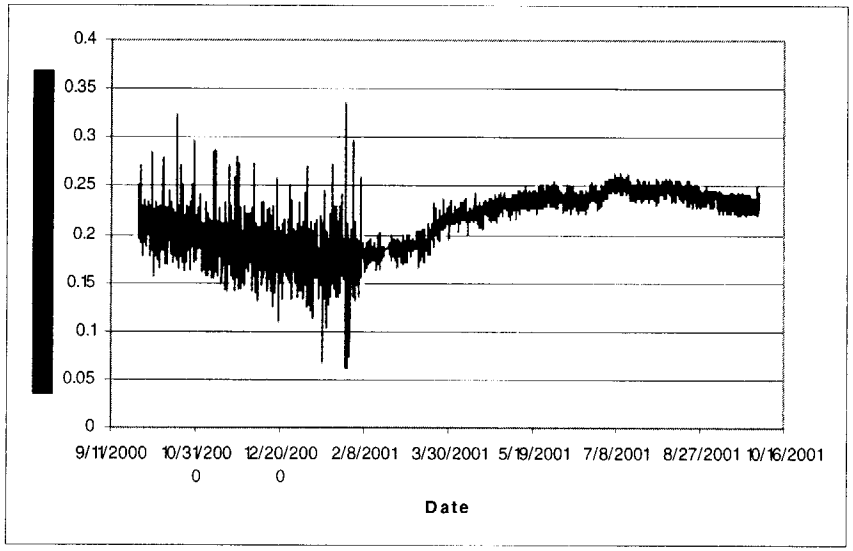

Figure G-40. LF 3-east 1.0 to 1.5 ft.

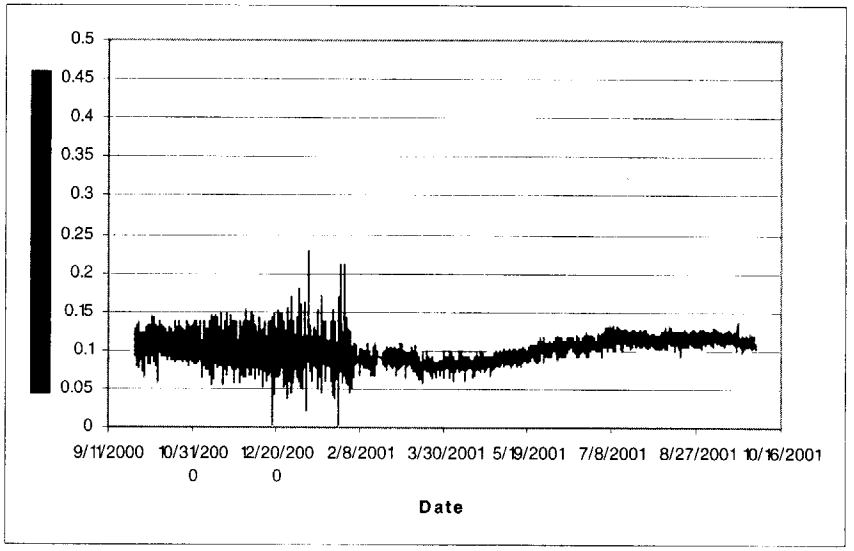

Figure G-41. LF 3-east 1.5 to 2.0 ft.

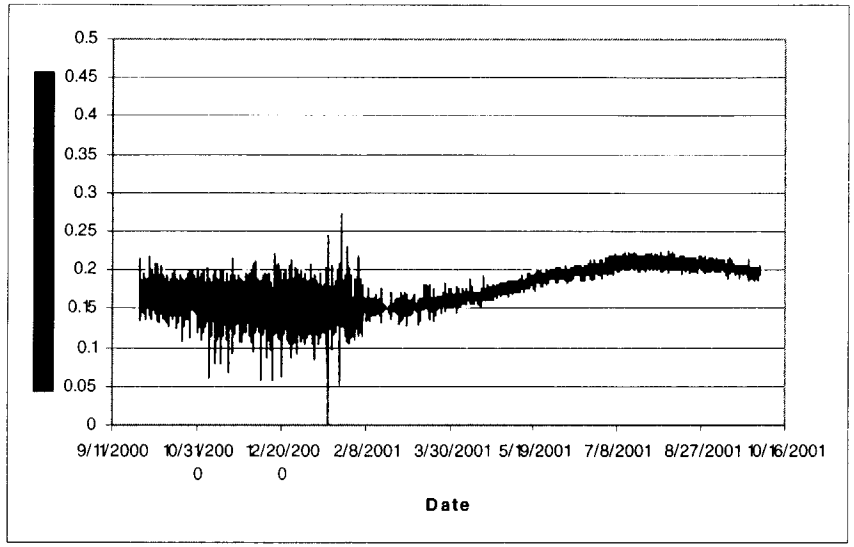

Figure G-42. LF 3-east 2.0 to 2.5 ft.

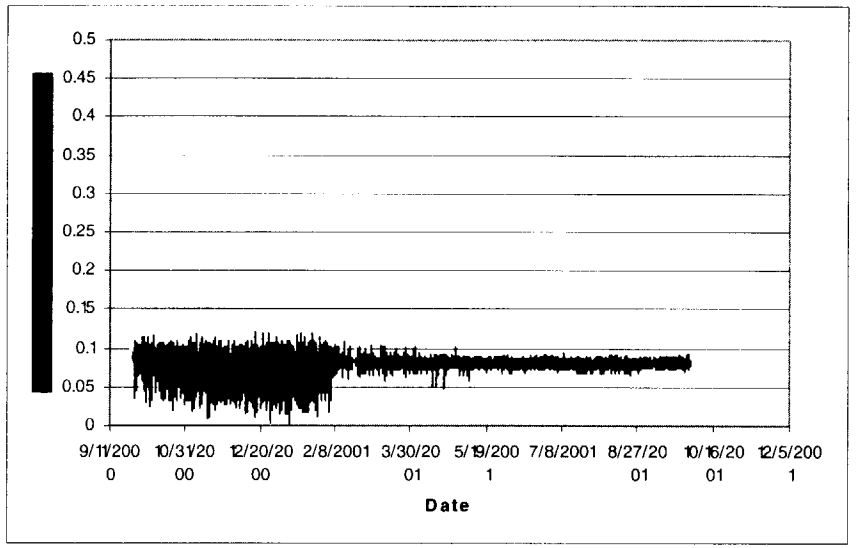

Figure G-43. LF 3-east 2.5 to 3.0 ft.

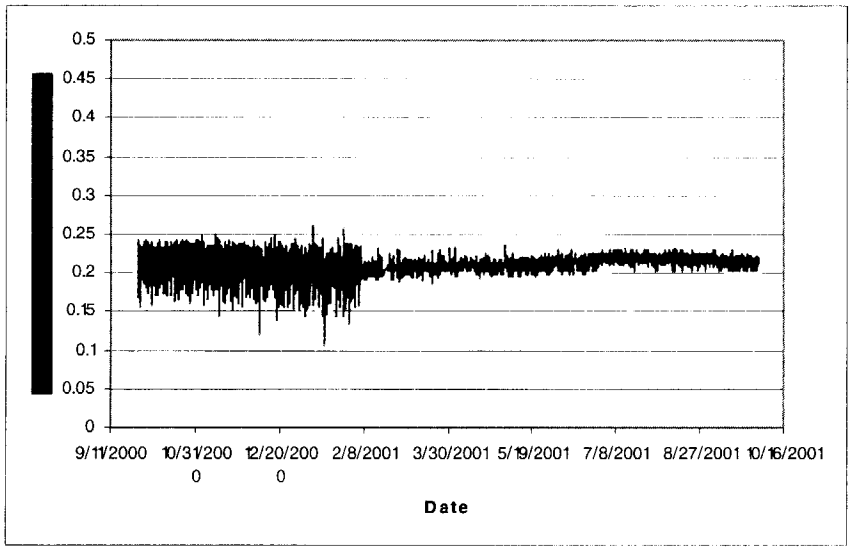

Figure G-44. LF 3-east 3.0 to 3.5 ft.

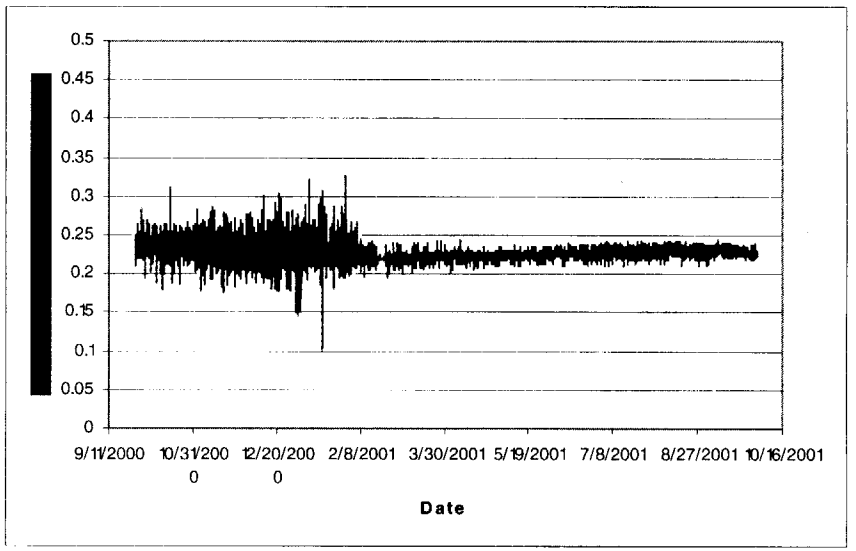

Figure G-45. LF 3-east 3.5 to 4.0 ft.

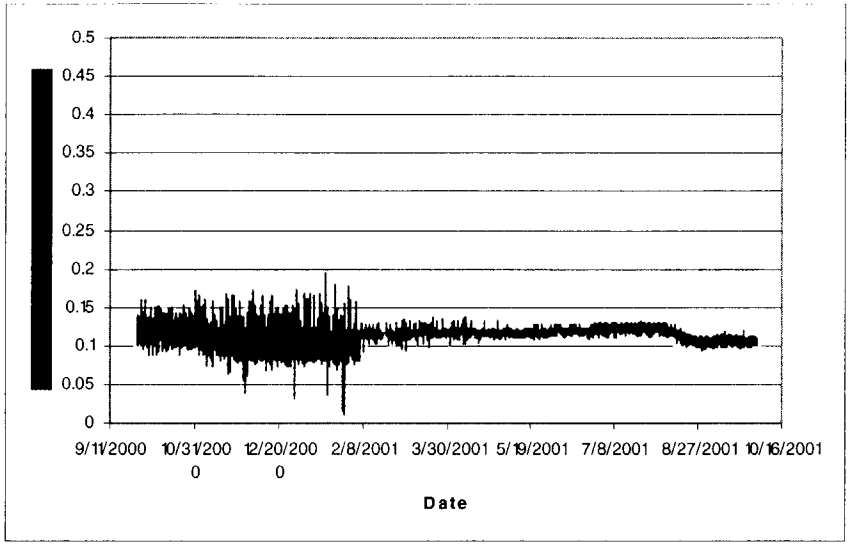

Figure G-46. LF 3-east 4.0 to 4.5 ft.

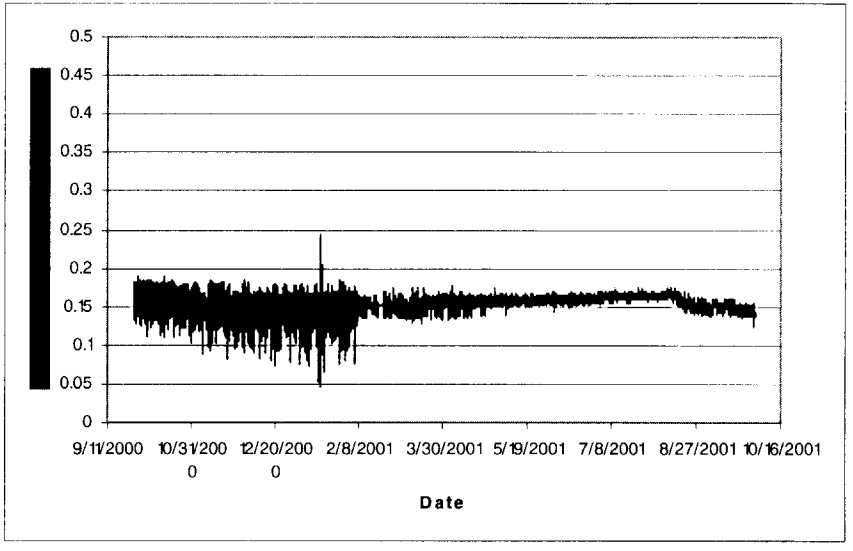

Figure G-47. LF 3-east 4.5 to 5.0 ft.

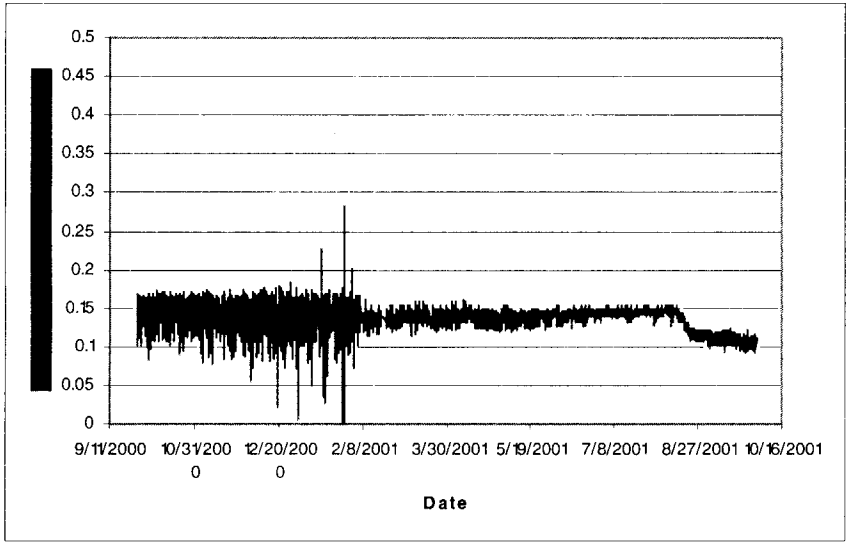

Figure G-48. LF 3-east 5.0 to 5.5 ft.

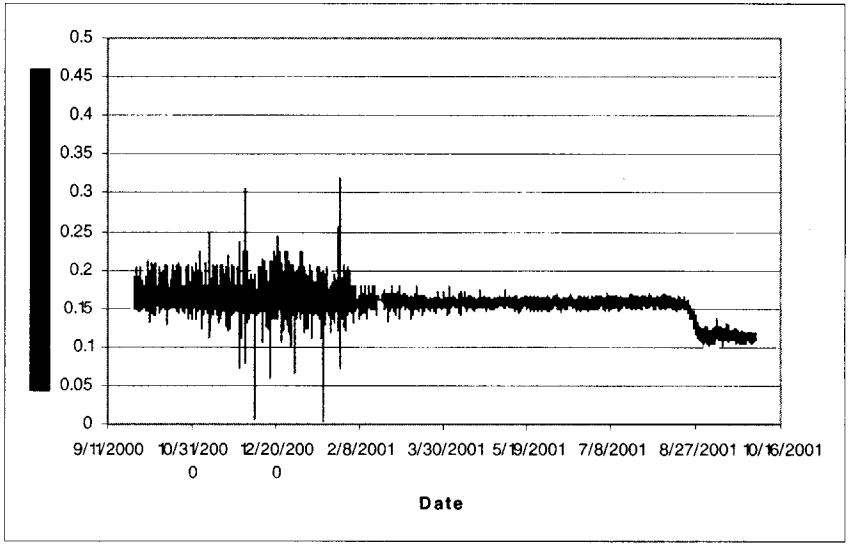

Figure G-49. LF 3-east 5.5 to 6.0 ft.

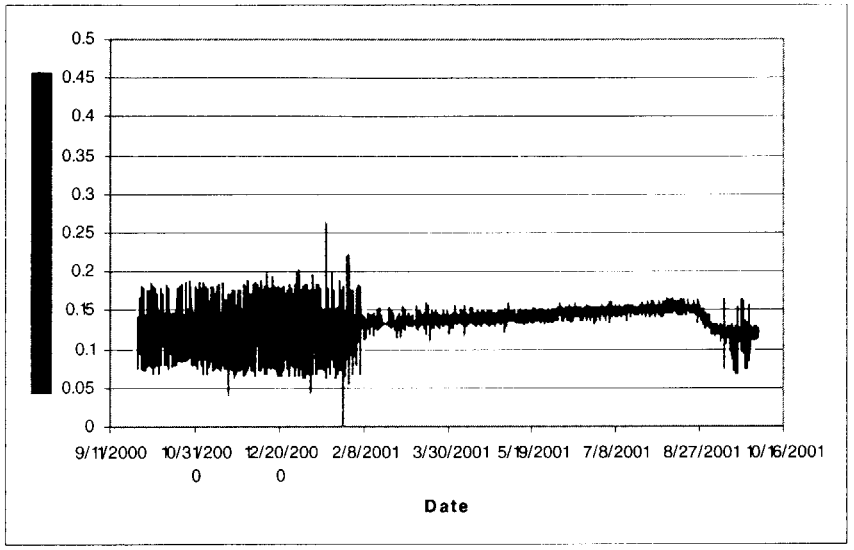

Figure G-50. LF 3-east 6.0 to 6.5 ft.

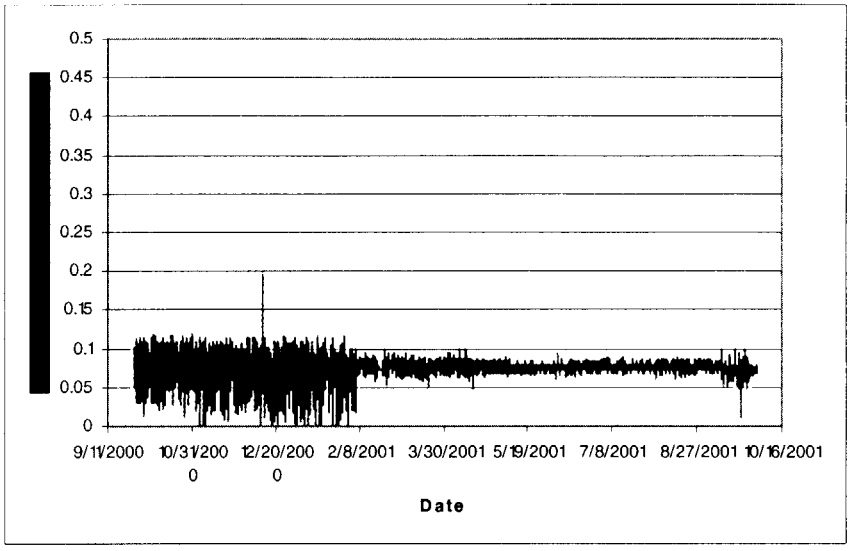

Figure G-51. LF 3-east 6.5 to 7.0 ft.

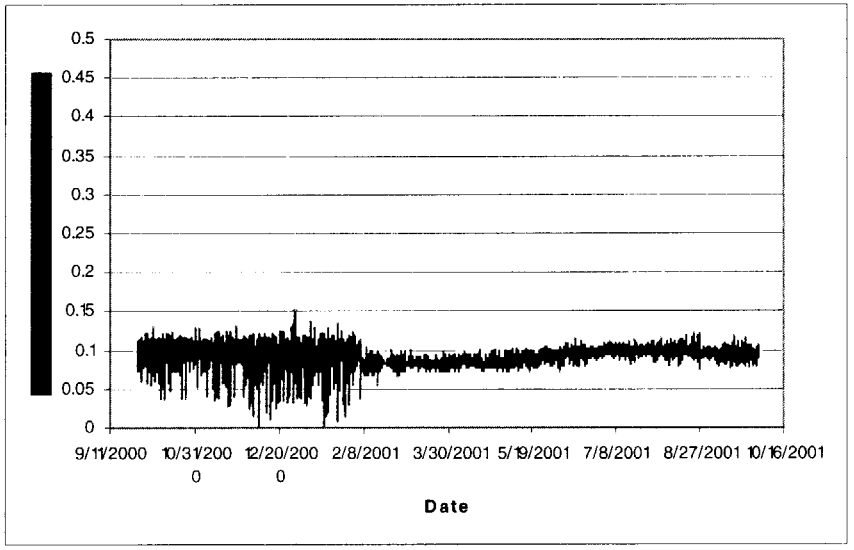

Figure G-52. LF 3-east 7.0 to 7.5 ft.

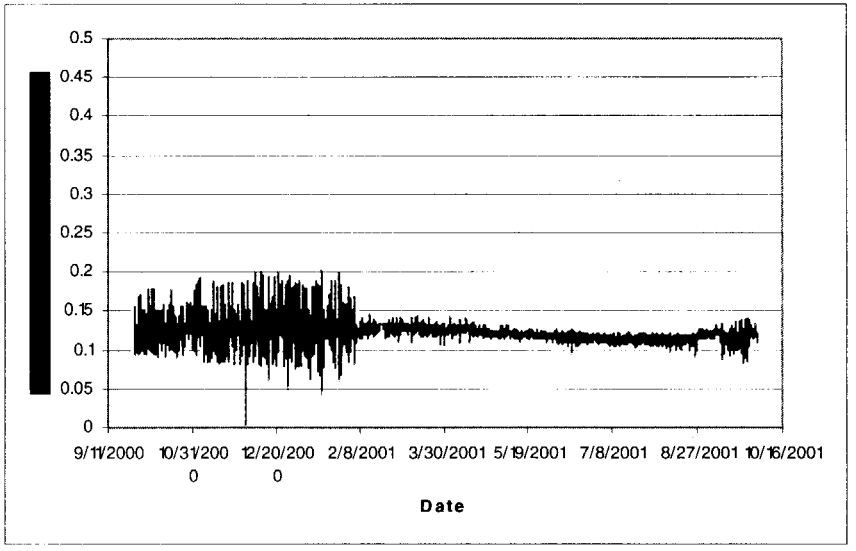

Figure G-53. LF 3-east 7.5 to 8.0 ft.

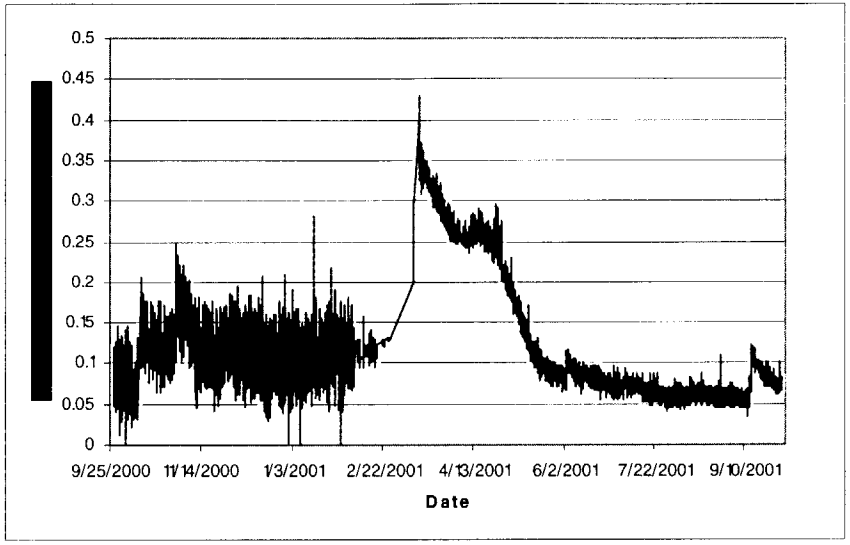

Figure G-54. LF 3-west 0.0 to 0.5 ft.

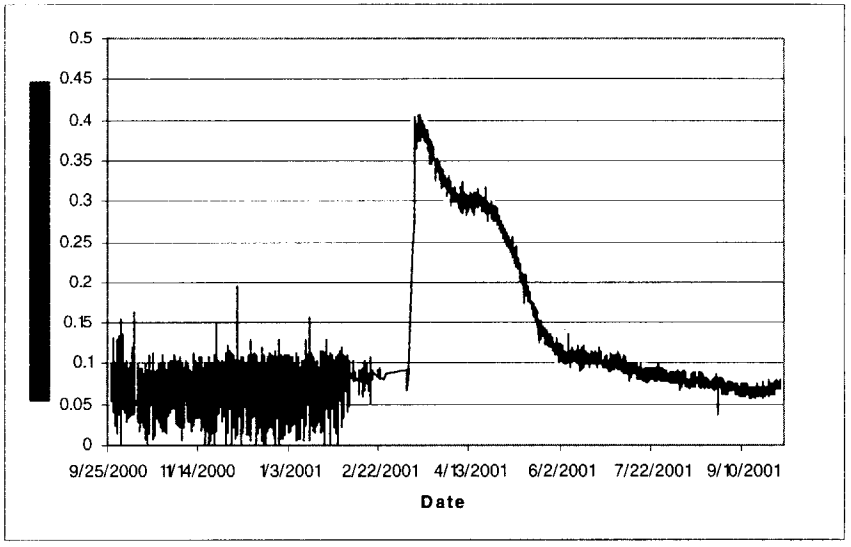

Figure G-55. LF 3-west 0.5 to 1.0 ft.

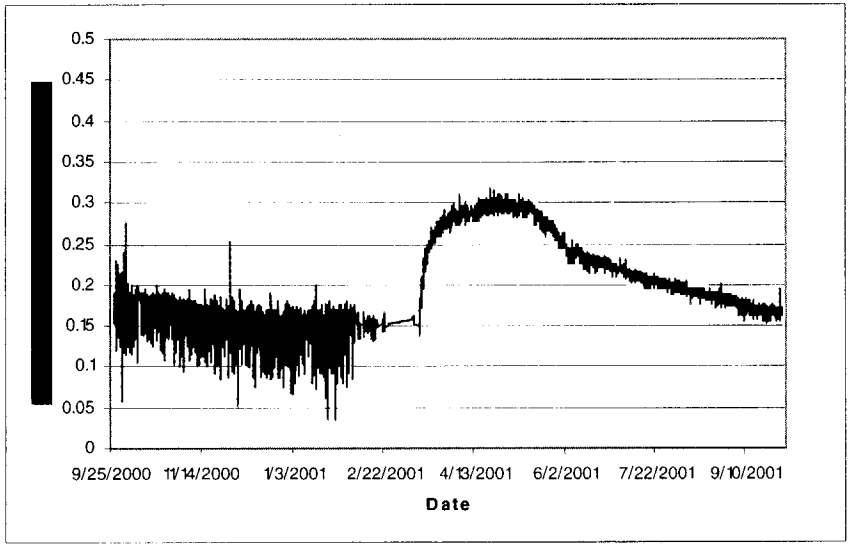

Figure G-56. LF 3-west 1.0 to 1.5 ft.

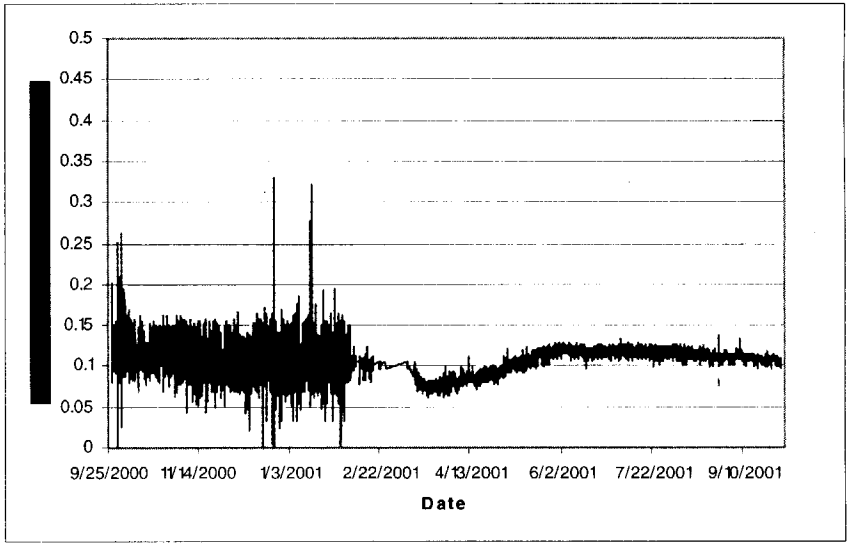

Figure G-57. LF 3-west 1.5 to 2.0 ft.

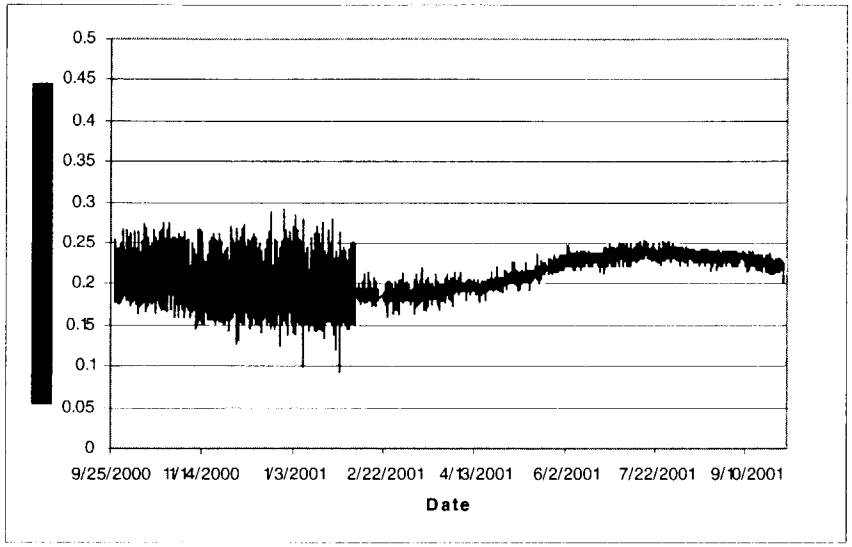

Figure G-58. LF 3-west 2.0 to 2.5 ft.

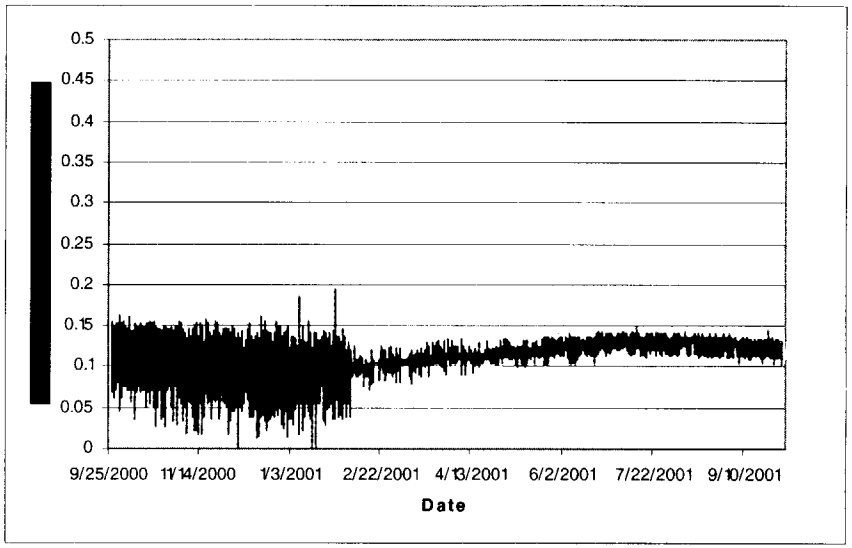

Figure G-59. LF 3-west 2.5 to 3.0 ft.

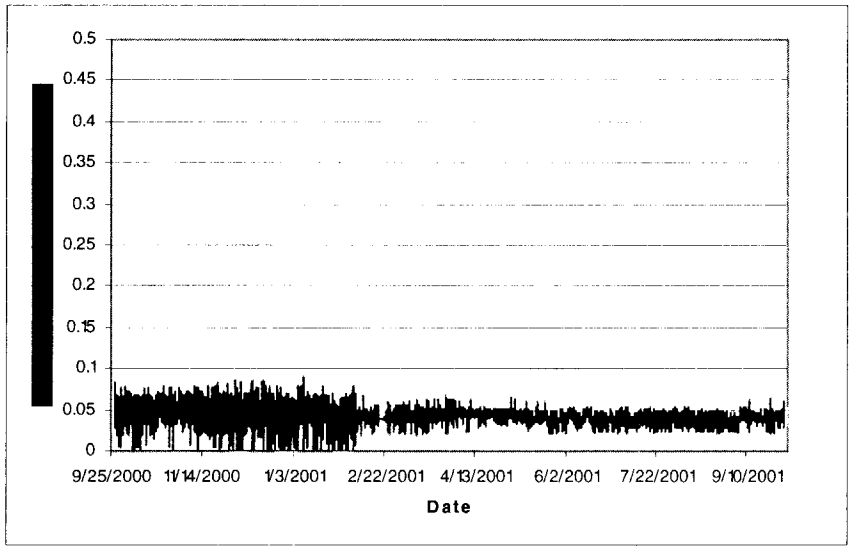

Figure G-60. LF 3-west 3.0 to 3.5 ft.

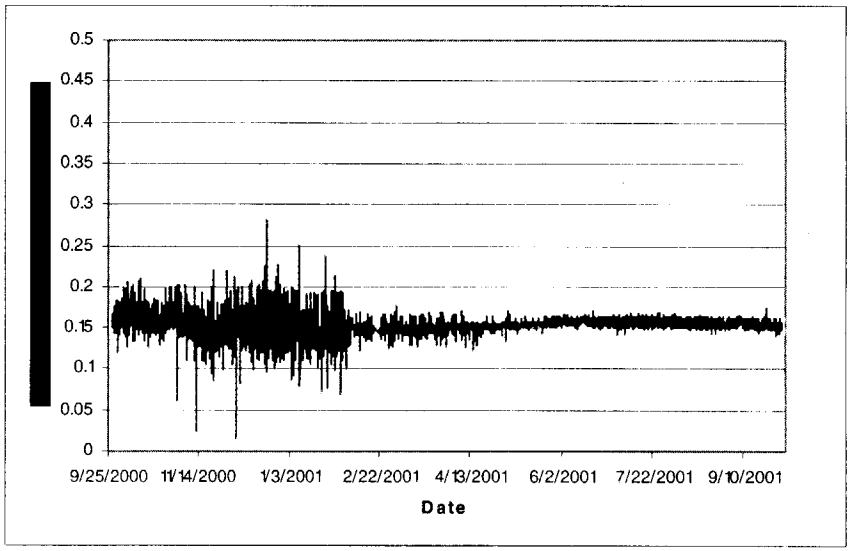

Figure G-61. LF 3-west 3.5 to 4.0 ft.

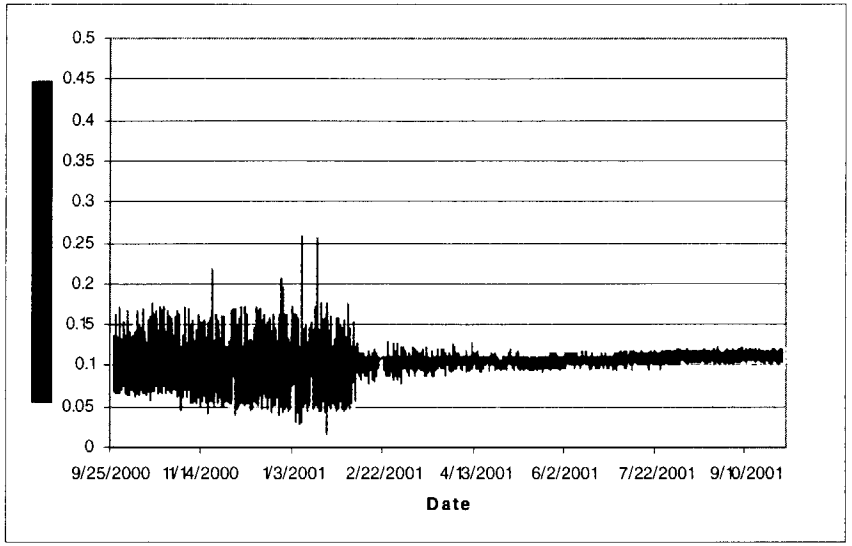

Figure G-62. LF 3-west 4.0 to 4.5 ft.

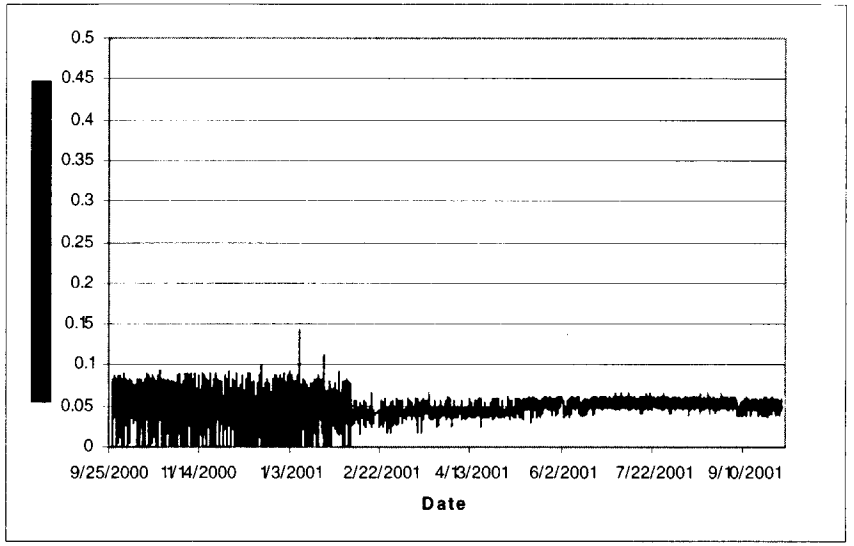

Figure G-63. LF 3-west 4.5 to 5.0 ft.

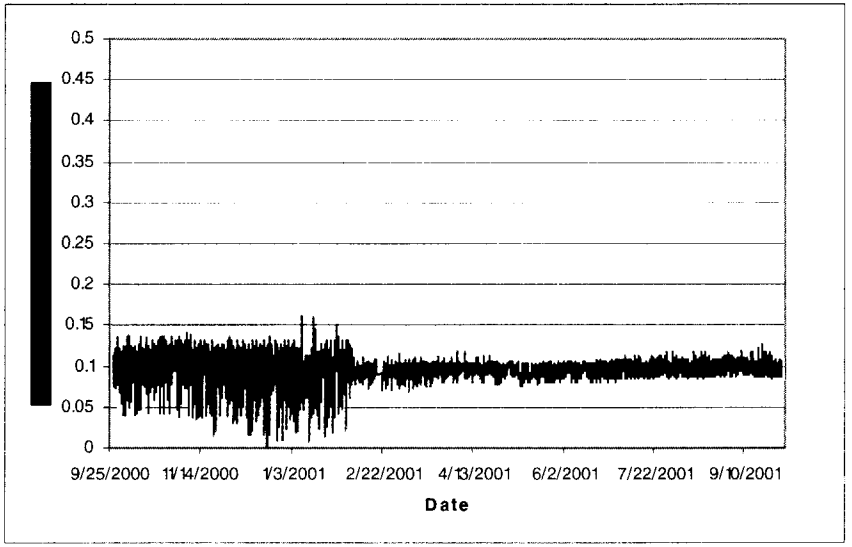

Figure G-64. LF 3-west 5.0 to 5.5 ft.

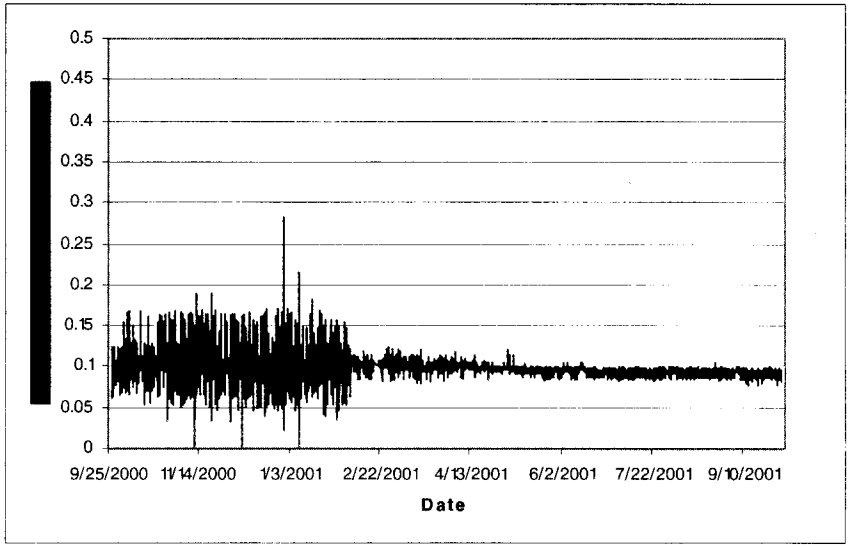

Figure G-65. LF 3-west 5.5 to 6.0 ft.

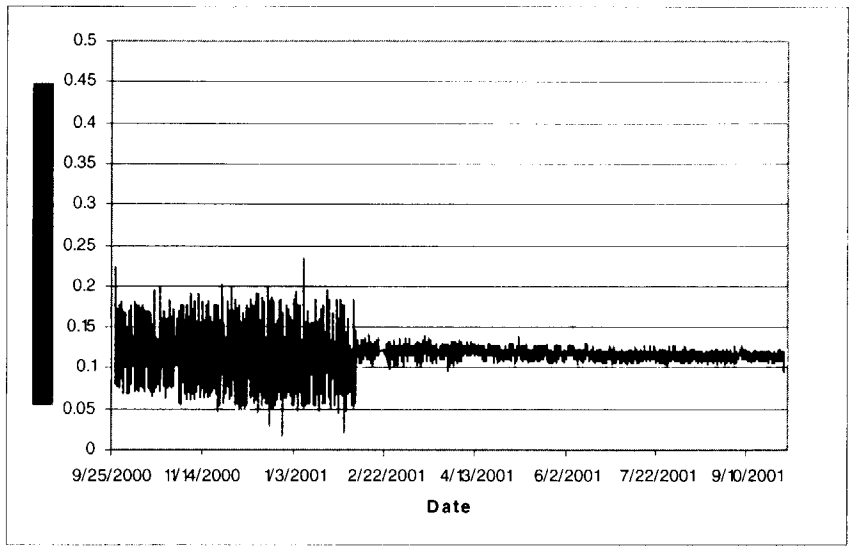

Figure G-66. LF 3-west 6.0 to 6.5 ft.

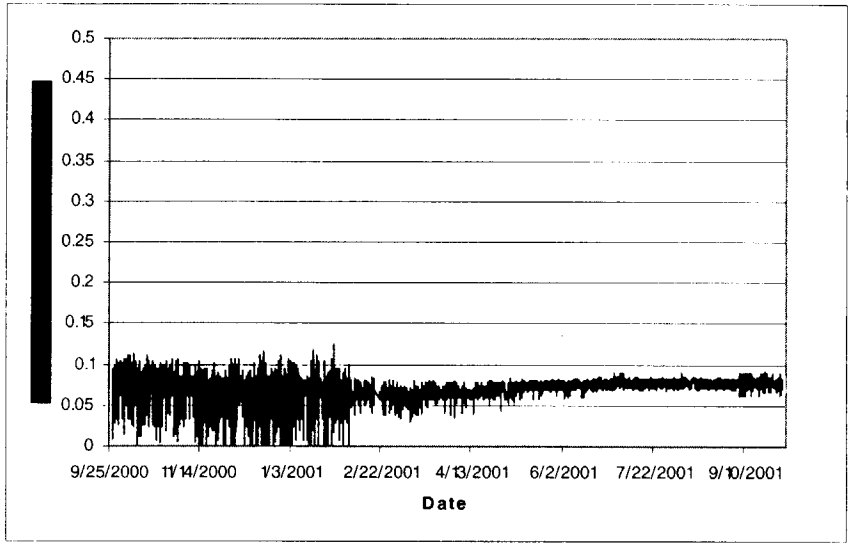

Figure G-67. LF 3-west 6.5 to 7.0 ft.

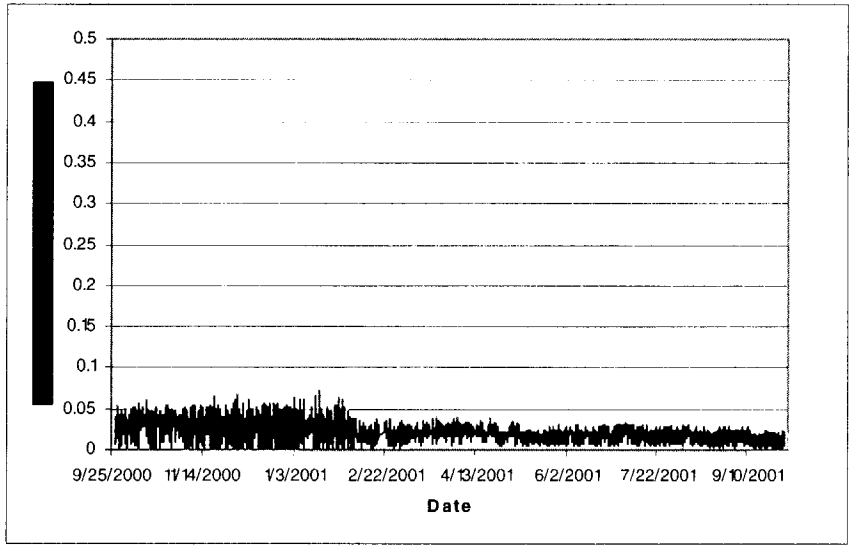

Figure G-68. LF 3-west 7.0 to 7.5 ft.

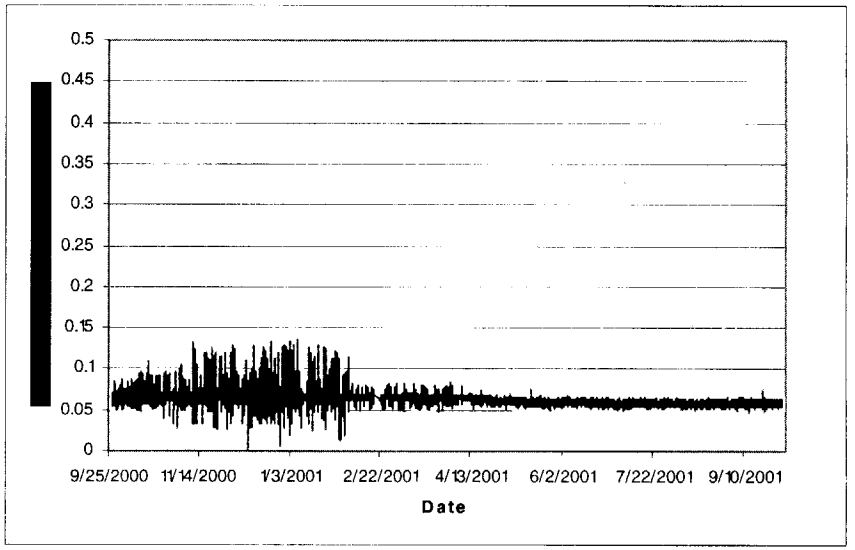

Figure G-69. LF 3-west 7.5 to 8.0 ft.

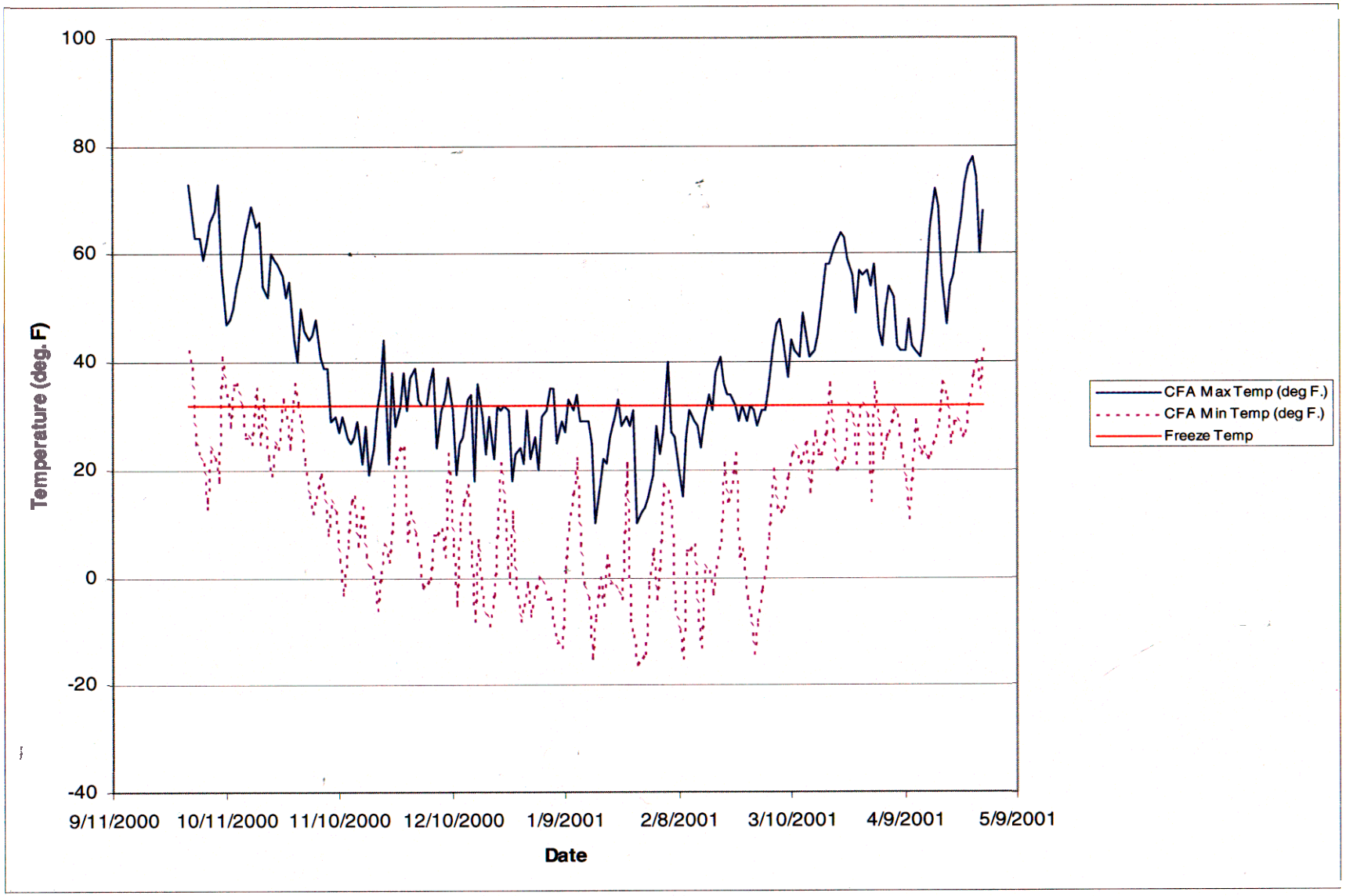

Figure G-70. Daily minimum and maximum temperatures.

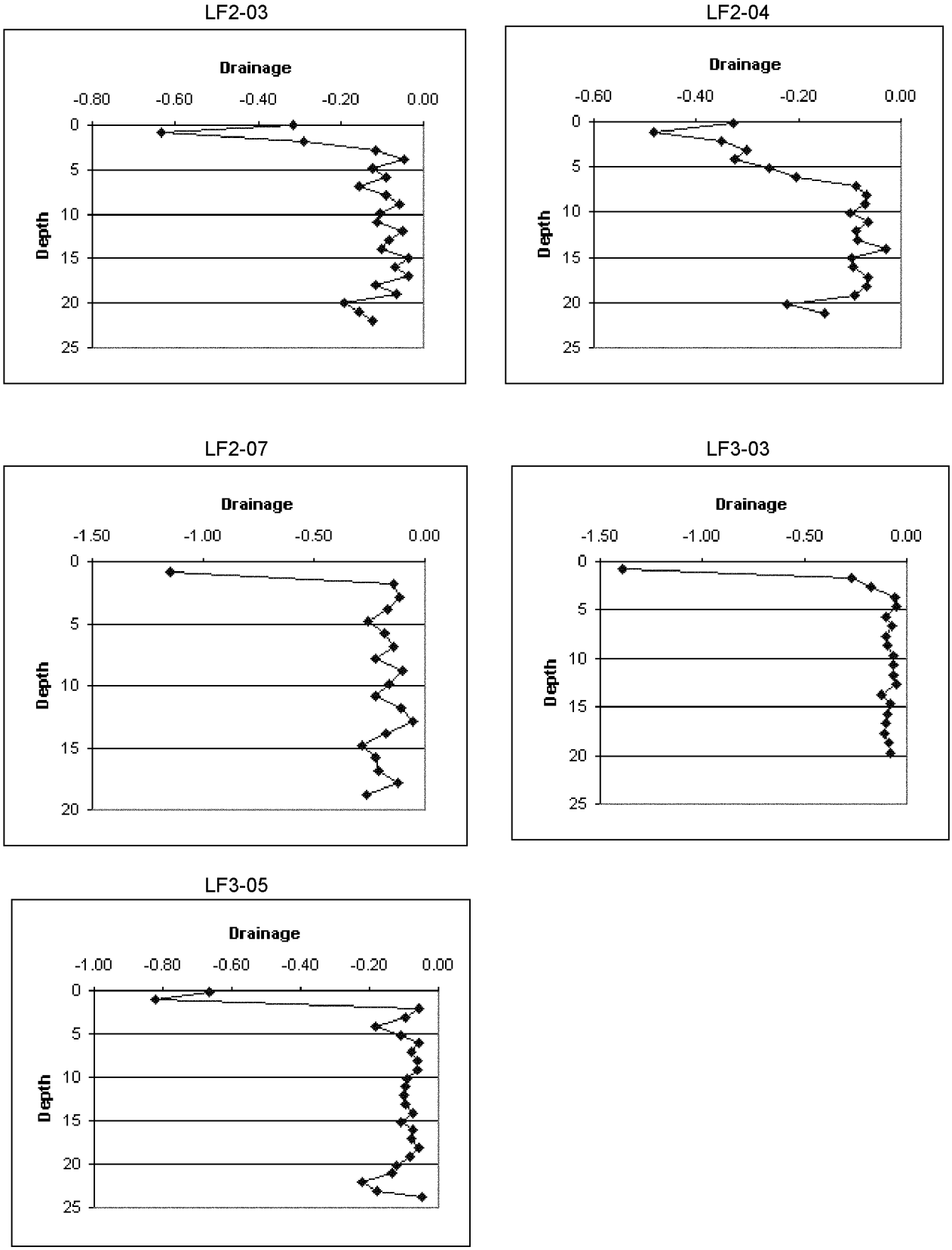

Figure G-71. Drainage plots for the NAT locations.